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THE BRICKBVILDER

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THE BRICKBUILDER.

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ADVERTISING.

Advertisers are classified and arranged in the following order:—

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Advertisements will be printed on cover pages only.

THE Architectural League of America is to hold its third annual convention at Toronto on the 29th, 30th and 31st of this month. There has been held during the last fortnight, in Boston, a convention of civic improvement societies which has been largely and enthusiastically attended and has awakened much popular interest. The Rotch Traveling Scholarship, in some respects one of the most potent educational factors for the profession in this country, has just made its annual award. These are three notable occurrences in one month selected out of many which give us cause for a certain taking stock, as it were, of the existing architectural conditions. This is the springtime, when human nature is temperamentally optimistic, when life and our profession all seem hopeful, and the world is too small almost for the energies of the enthusiasts who do so much to keep alive the spirit of progress. We can look forward with every hope for future possibilities. We can also look backward with a considerable degree of satisfaction to the progress which we can actually trace. It is by measuring our past successes and failures that we are able to rightly meet the problems of the present and prepare for those of the future. Even the most autumnal pessimist would find it difficult to complain of the past.

THE Architectural League of America, though hardly three years old, has become a vital factor in the professional growth. It is not always easy to measure forces of this kind, and the architects in New York, Philadelphia, Boston or Chicago might very readily fail to appreciate how much the League stands for to the architects in other cities. It is not good for man to be alone in any department of human thought, and the League is able to bring about a very considerable degree of community of interests which makes for a broader feeling, a more keenly sensitized public spirit and an enlarging of the hopes and aspirations, if not the actual possibilities, of architects both young and old; and, after all, the spirit of hopefulness is what we sometimes most need. To show how others meet their problems; to make possible a personal acquaintance with those who are called on to battle just as we do; to sharpen æsthetic appreciation by contact with keen minds; and to broaden and unify the processes of architectural education, especially among the vast number of those who are perforce educating themselves, — these we take to be the objects of the Architectural League. These are surely included in the list of work which the League is accomplishing, and the gathering at Toronto will be more than a mere pleasant reunion. Those who remember the convention at Philadelphia last year will recall the excellent spirit which prevailed through all the meetings, and how we parted with a sense of moral bracing, with increased self-respect, which was sure to react on our professional work. And while the convention of the League does not intrench upon those strictly professional aspects which are peculiarly a function of the American Institute, it has stepped into a field of its own in the fostering and encouragement of a mutual desire for the best architecture by the younger members of the profession.

THE Civic Improvement Convention is another sign of the times. This convention was not architectural except as an incident. It appealed to every one who, accepting conditions as they were, has any desire to make them better; and the man or woman who cannot be classed in this category must be blind indeed to all that is going on around us. The civic improvement work has swept like a wave over this country during the last year. Residents of the few larger cities hardly appreciate what has been done, for the work has grown almost entirely in the small towns and cities. It has transformed many towns of the western and middle states from dreary, uninteresting aggregations of houses to tree-embowered parks. The architecture itself in these towns is not yet much better than it was, but that the public sense is aroused, and the fact that any considerable proportion of the community desires better things, is one of the most hopeful signs of the times marking

the new awakening which has accompanied the growth of this nation in its material aspects. The work of civic improvement is closely paralleled by the work of the Architectural League and of the other art associations throughout the country. Its effects have come to stay, and we can never fall back into the dreary civic indifference of twenty or twenty-five years ago.

CIVIC improvement has been largely a matter of the smaller cities and towns. The large cities, however, up to a certain extent caught the spirit. Our municipalities during the last year have recognized as never before the necessity for selecting good men and having their work done right. St. Louis has made a splendid stand in schoolhouse improvement by placing it so largely in the hands of Mr. Ittner. In Boston Mr. R. Clipston Sturgis, who is so well known to the profession, has been made a member of the schoolhouse commission, the body which has immediate charge of the erection of school buildings. Some time ago Mr. George L. Hines accepted an appointment as state architect for New York, which implies, if the politicians do not interfere too much, that the state may be at least saved from some of the public atrocities which have disgraced the past. In New York City Mr. William Martin Aiken, who made such a good record as architect of the treasury department, occupies the position of consulting architect for the building department. These are only a few indications that our municipalities are learning how to get the best and that they mean to retain it.

NOR is our national government behind in the race. In the former times when the government wished to make a local improvement it was placed in the hands of the politicians, or at the most, and what amounts to practically the same thing, it was handed over to a commission of lawyers. Now, when the feeling for civic improvement stirs our national capital, Congress appoints a commission composed entirely of experts, including men at the very top of the architectural profession, and this commission is given the freest hand to study and report upon the very best possibilities. The result is the splendid collection of drawings and photographs which Messrs. McKim, Burnham, Olmsted and St. Gaudens have brought together to show what might be done to beautify Washington. And our strenuous President has resolutely tackled the time-worn problem of how to increase the capacity of the White House and, seeking advice, has looked not to politicians but to those who make it their business to study just such problems and solve them successfully. Mr. McKim has been commissioned to design a separate building, removed from the White House, to which the business offices for the President will be transferred. He is also employed to study the remodeling of the White House itself, and in his hands we can be sure that the interiors, which have before been so unworthy of our President's office and the nation, will be made all that they should be. These appointments are also signs of the times.

WHEN the Rotch Traveling Scholarship was founded twenty years ago it was alone of its kind. For nearly a generation it has been stimulating the zeal of our broadest young men and holding up to the juniors of our profession a prize which has almost invariably when won been used in the best possible manner. Now there are many scholarships, and every year an increasing number of picked young men are sent abroad to study, and come back to take their places in the development of our national art. It has quite recently been proposed to establish a national scholarship, and there have been steps taken looking toward the founding of an American academy abroad endowed and sustained by our national government. This would have been an absolute impossibility twenty-five years ago or even less, but the growth of public spirit has recognized the national necessity for fostering of the fine arts. One of the subjects to be discussed at the convention of the League is an American Art University. And all these influences in a sense have grown out of a feeling which in its earliest form gave rise to the Rotch Scholarship.

THIS country is still young in one sense. For that matter the world is young in the same sense, for all over the world humanity is daily learning new lessons and art is seeking new expression. But there is a freer field here, our youngness troubles us less where we have less tradition to bind us, and looking from what the past has brought into our national development towards the possible future which may lie before us, we can feel nothing but hope for the architectural profession. Our opportunities will be larger, they will be better met; our measure of growth will be greater than ever before; and though many of us will make mistakes and successes may turn our heads, the resultant of all our strivings, our conventions, our scholarships, our public civic spirit and individual enthusiasm, is bound to be in the right direction.

OUR architectural accomplishments are very creditably presented in the pages of the Architectural Annual, edited by Mr. Albert Kelsey of Philadelphia, the appearance of which has been timed very happily to coincide with the other occurrences of this month. Mr. Kelsey is nothing if not enthusiastic. He views everything in the strong hopeful light of the man who loves his work and his fellow workers and who delights in the zest of competition just for its own sake. His criticisms of current architecture are frank and straight from the shoulder. Whether we agree with him in detail or not, we recognize their honesty and the attempt of their author to look every problem square in the face and seek for the best there is in it. In turning over the three hundred odd pages of this Annual one has a feeling that the author has during the year been on the alert to cull out everything from modern architecture which seemed to him thoroughly good and to present it here in its most attractive form. We do not unreservedly assent to either the choice or the criticisms. There would be no growth if we all felt alike, and differences of opinion give to our thoughts the glow of health; but the spirit that prompted the compilation of this Annual is surely worthy of encouragement if for no other reason than that it helps to keep things going, prevents moth and rust and the theft of our best intent.

The Business Side of an Architect's Office. II.

BY D. EVERETT WAID.

THE three functions of an architect's office named in the first of this series may enable the reader to discern some order in these scattering considerations. First, then, the preparation of drawings.

If certain little details become the rule or habit of a draughting room, some of them prevent awkward omissions, some are matters of business convenience, and still others are as important as is the phrasing of a contract, of which they in reality form a part.

Every sketch even should have a date, for the lack of a date sometimes becomes a matter of considerable moment. The other features of the title of a drawing illustrated (Fig. 1) are matters of more or less importance and convenience. Even in small offices it is well to have initials signed to show who made a drawing, who checked it and on whose approval it was issued. It certainly should be a rigid rule that no drawing or sketch, however abbreviated (except those copied as parts of letters), is to go out of the office without being entered in the list of drawings.

For purposes of record, ordering blue prints, etc., no title at all is needed save a circle with sheet number in it, building number above it and date below it. (See Fig. 1.) The pencil drawing in the illustration is, as indicated by its number, sheet 2 of the second series of sketches for a country cottage. It was building number 533 and was made February 5, 1902. The title below it in the illustration is copied from a regular working drawing.

For convenience of reference in correspondence the numbering of all windows and doors on the plans is a useful device. On the basement plan all openings are numbered in rotation from 1 up; on first-story plan from 100 up (or for a large building 1,000 and up); second story, 200 and up, and so on.

If the various rooms lack distinctive names, it is convenient oftentimes to number each one with a broad-faced figure or a Roman numeral.

In placing dimensions on drawings it is a good rule to run two complete lines of figures on all four sides of the building, particularly on both basement and first-story plans. This allows a contractor to check the figures and avoid a mistake which sometimes results from the blurring of a figure on a blue print by an accidental drop of lime. For the same reason, interior lines of figures should run through to the full totals. Never depend on a single figure to locate a partition. Another good office rule is to have all figures checked by a different person from the one who made them.

Although it is usually impracticable to adopt a uniform size for all drawings, it is a matter of convenience to adhere to one size for all the drawings of a particular building, or, in the case of full-size details, some multiple of the adopted size.

It seems to be common practice to file drawings of current work in drawers. In A. J. Manning's office, New York, after a building is completed, one set of drawings is preserved, folded and placed in a special file similar to a letter file but the size of legal cap. All documents, correspondence, specifications, etc., are placed with the drawings in the same box, and the long row of such boxes, the accumulation of years, in the order of the building numbers makes a tidy-looking library.

Kendall, Taylor & Stevens, Boston, file their drawings flat, all hung in cupboards, which serve as a file for completed work as well as for work under construction. (Fig. 2.) The drawings hang vertically by means of wood strips between two of which each set of drawings is bound.

C. H. Blackall, Boston, has varied their idea and in a large cabinet has hinged a lot of stock doors. (Fig. 3.) These doors hang six inches apart at the back and have hooks screwed to their faces on which are hung the office copies of drawings. Each set of drawings is secured to a stick ½ inch by 1½ inches by 3 feet long by means of small bolts and washers and thumb nuts. In the top edge of the stick two screw eyes are placed to engage corresponding hooks on the doors. Five sets of drawings

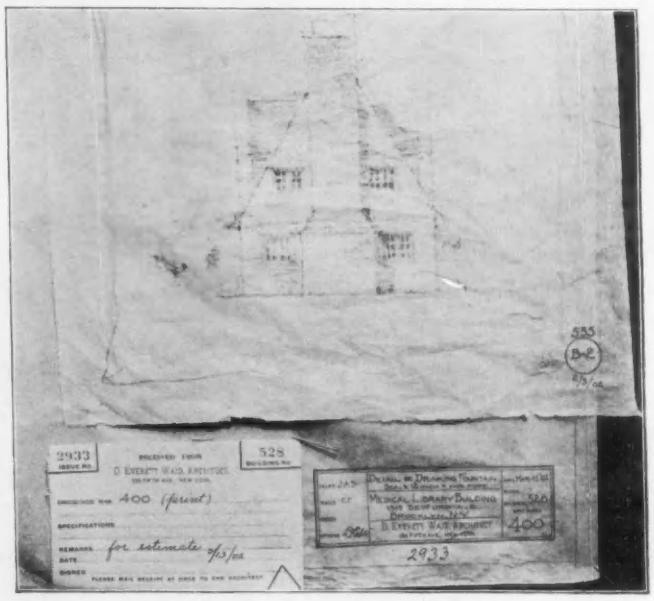


FIGURE 1.

can be hung on each side of each door, and any set is easily lifted out or replaced without disturbing the others. Often they can be consulted in place by swinging the doors apart. Sets of drawings for current work are kept in this cabinet for convenient reference. When a building is completed the drawings are removed from the sticks and filed away flat in drawers. A number of large offices have done away with the method of keeping drawings rolled, and file them flat. Some place their drawings in large folders or big "home-made" envelopes. In this shape they can be filed most compactly either in drawers or on shelves and of course in order of the respective building numbers.

Without launching into a treatise on specification writing, it may be remarked briefly that a few considerations should be kept in mind for business reasons. One may indulge in very comprehensive general clauses in his specifications for the purpose of guarding against omissions and throwing responsibilities on contractors. But if one does not follow these with painstaking, specific pro-

visions he is likely either to make the work unduly expensive to the owner or get caught with some awkward oversight, or perhaps both.

For example, the following two phrases are suggestive of a desirable method: "This contractor shall furnish and set all glass needed fully to complete the building, with exceptions specifically mentioned herein," and "All glass not otherwise specified shall be best quality polished American plate." Such clauses guard against the possibility of finding that no glass has been provided for essential parts of the work, but such general provisions should be followed by detailed requirements, otherwise plate glass will be used where other kinds should have been used and in some places where cheaper glass might have been used; and there may be a dispute over mirrors because they were not definitely mentioned. This is given simply as an illustration applying to specifications for the various branches of work.

The matter of shop drawing is one that should be emphasized strongly in specifications of steel and iron work, cut stone, etc., if one wishes to avoid disappointment in the execution of his designs. Slight, easily made changes in iron drawings may prevent humiliating and serious disfigurements. Cut stone contractors are prone to arrange the jointing and the thickness of ashlar in a way to save stone and thus make the work cheap in appearance as well as unsubstantial structurally; their drawings should be submitted to the architect.

All shop drawings should be scrutinized carefully. But during a rush of work some shrewd or careless provisions in shop drawings may easily slip the architect's attention. A valuable safeguard in this matter is one used by Frederic Thomas, who gives contractors written notice holding them responsible for departing from the architect's designs. I have thought it wise to use his idea in specifications and make it read somewhat thus:

"Shop Drawings. — The contractor shall submit all shop drawings to the architect for approval before execution. Each drawing shall be submitted in duplicate, and one of the copies will be returned to the contractor with approval or corrections noted thereon. The architect will not be responsible for the checking of figures on shop drawings. The contractor shall not make any deviation from the architect's drawings without calling the same to the attention of the architect in writing, and he may be required to replace work for which no permission has been obtained to make such deviation."

Without discussing specifications further in this connection the following are given as useful preliminary paragraphs which, with slight modifications, can be used in writing specifications for any branches of work. A large part of the following has been borrowed from the specifications used by George B. Post, whose courtesy is hereby acknowledged.

General Conditions. — The contract based on this specification will include the furnishing by the contractor of all material, labor, scaffold and other apparatus necessary properly to prosecute and fully to complete the entire painting and glazing as herein described or shown on the accompanying drawings, Nos. ———, and including everything necessarily involved or which reasonably can be inferred, with exceptions mentioned hereinafter. All necessary freights, cartage and cost of handling materials shall be paid by the contractor. All notes, figures and details on said drawings shall be followed and executed by the contractor as a part of these specifications without further mention.

On drawings concrete is shown in section dotted, brickwork hatched and stonework more coarsely hatched.

Complete full-size detail drawings will be furnished by the architect, and the contractor must apply for same before executing work. If the contractor considers anything in any full-size detail as beyond the requirements of the contract he shall at once notify the architect. Failure to make such claim within ten days after receipt of any detail shall constitute an acceptance of the same. Large scale and full-size drawings shall be followed in preference to small scale drawings. Shop drawings, templets, models and all necessary measurements at the building shall be made by the contractor. Figured dimensions on the drawings shall be followed in all cases in preference to scale measures.

The contractor shall be responsible for the correct execution of this work according to the drawings. Any

FIGURE 2.

apparent error in the drawings must be reported to the architect at once, and the contractor shall not proceed with the work or make any variations from the drawings without written orders. The contractor shall be responsible for verifying all measurements at the building and reporting any inconsistencies or errors of other contractors before executing his own work.

Any work made without or not in strict conformity with the drawings or which differs from the requirements of the drawings and the specifications will be rejected, and must be removed and replaced with work in conformity with the contract. All work injured or destroyed thereby shall be made good at the contractor's expense. The owner, through the architect, reserves the right to cancel the contract in case the contractor neglects or refuses to remove rejected work, and to replace the same in accordance with the above specifications.

No extra work shall be done without written order from the architect, and all such orders must be referred to by numbers in bill rendered before final certificate is issued. Special emphasis is laid on the requirement that no extra work shall proceed without written order except in an emergency, and then it must be followed immediately by the written confirmation.

All material and workmanship shall be new and the

best of their respective kinds and subject to the approval of the architect.

No work shall be sublet without written approval by the architect of the parties to be employed as subcontractors. The contractor shall submit with his estimate the name of the subcontractor for each principal branch of the work. Failing to do this, he shall be limited in the taking of sub-bids to the list of contractors approved by the architect.

When more than one kind or manufacture of a material is specified the option shall be with the contractor. When one kind or "equal" is specified no change may be made without written consent of the architect, who may select an equivalent if requested by the contractor.

Each contractor shall be responsible for the protection of his own work until the final completion of the building, and each shall be responsible for and shall make good at his own expense any and all damages done or caused by his workmen or due to the execution of his contract.

In order to insure consideration all bids must be made out in accordance with the form accompanying this specification and with all items of prices, etc., filled out.

A schedule of the prices on which the contract is based must be furnished to the architect before the contract is signed, which schedule shall be the basis for all payments on account of the contract.

The owner, through the architect, reserves the right to reject any or all bids.

Time of Completion.— The entire building shall be completely finished and delivered ready for occupancy on or before the first day of ———, 190–.

The work included in this specification must be prepared and erected in its various stages at such times as may be necessary to complete the building by the time mentioned and without interfering with or delaying the progress of the work of other contractors.

The contractor shall provide all necessary night and overtime work without extra charge.

If any delay occurs in the progress of this work or if the work of other contractors be delayed on account of delay in the painting and glazing work or on account of replacing or altering defective or rejected work, the contractor shall pay to the owner, or if so directed by the architect, to the general contractor, the sum of one hundred dollars ($100) as liquidated damages for each day that he so delays the work of another contractor as to interfere with the completion of the building at the time specified or for each and every day that the various parts or stages of the work included in this specification may be unfinished after such times as may be determined by the architect as necessary for the erection of such parts or stages of the work.

Payments will be made only on the certificate of the architect.

On or about the first day of each month a certificate will be given by the architect for a payment on account of the contract of eighty-five per cent (85%) of the value of the work furnished and put up at the building, provided the contractor has made application over his signature on or before the twenty-fifth day of the preceding month and that a schedule has been furnished as before specified.

A certificate for the balance will be given by the architect upon completion of the contract in conformity with the drawings and specifications, application having been made as before specified.

No certificate will be given in case any work is furnished not in strict conformity with the drawings and the specifications, until defective work has been removed and replaced as specified and to the satisfaction of the architect.

Any certificate given or payment made on account of the contract for work furnished and erected at the building does not act as an acceptance of any materials or work which subsequently may be found to be defective by reason of existing defects at the time such certificate is given or payment made or defects arising from accidental injury or otherwise until the completion of the contract.

The contractor shall replace all defective work on which payments have been made before final certificate will be issued.

FIGURE 3.

Subcontract. — The contract for the painting and glazing work will be made at the option of the owner a subcontract to the general contract for the erection of the building, and all payments, in the manner described, will be made by the general contractor, and the contractor shall be liable to the general contractor for the proper performance of the contract, and shall not be relieved from any of the obligations herein specified.

Cutting. — Each mechanic or material man shall do all cutting in his line to accommodate the work of others, and shall repair his work after all other mechanics.

Superintendence. —The contractor shall give his own personal supervision at the site and at shops. He shall place a competent foreman in charge at the building, who shall remain in charge constantly throughout construction, or until replaced on written consent of the architect.

Rubbish. — The contractor shall remove his rubbish from the building or premises as often as directed by the architect. On completion the contractor shall leave his work clean and whole, and satisfactory in every way to the architect.

Guarantee. — The contractor shall be responsible for and must make good any faults appearing in his work within eighteen (18) months after acceptance, if due to any defects of material or workmanship.

A French Gothic Cathedral in Brick.

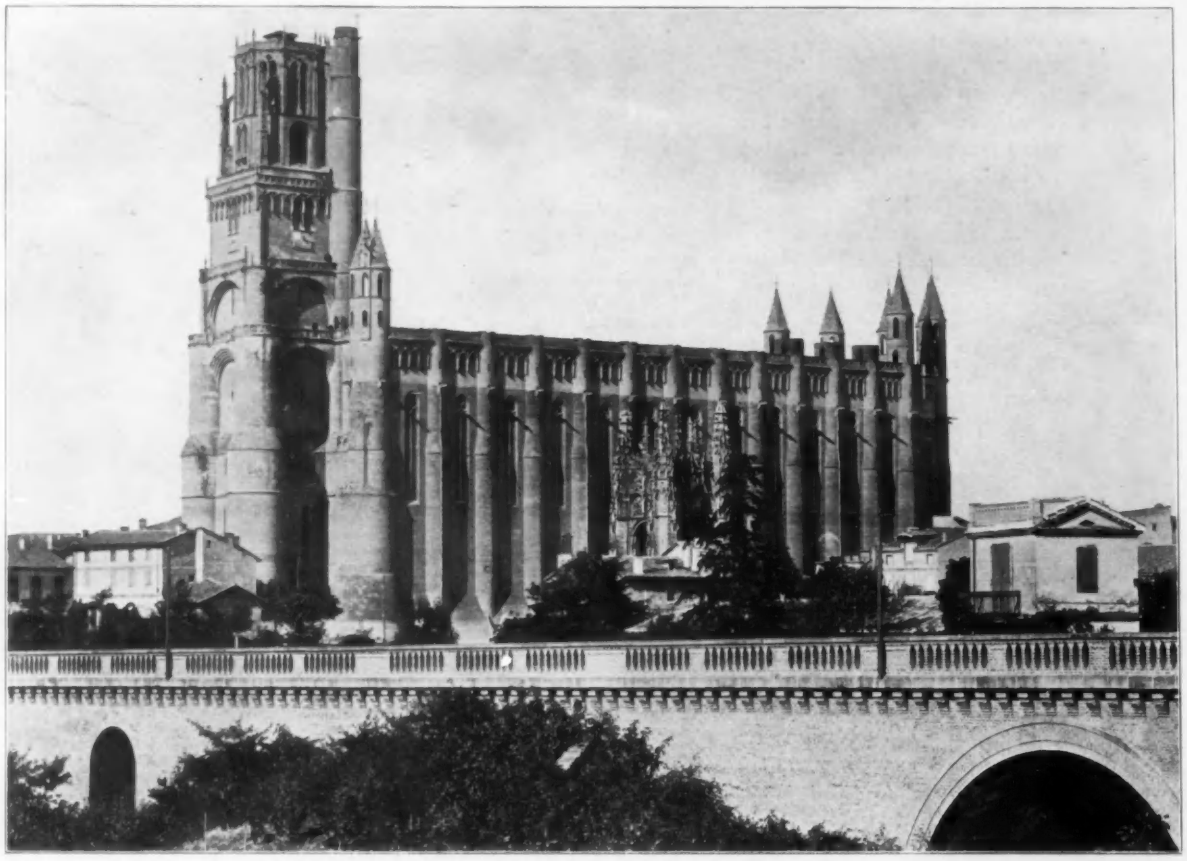
BY JEAN SCHOPFER.

ALBI CATHEDRAL.

THE Gothic style of architecture is, as everyone knows, primarily a style of architecture in stone. When at the beginning of the twelfth century the problem of vaulting large areas in the cheapest and at the same time strongest manner — the problem which had exercised the minds of the mediæval architects — was solved in France by constructing vaults on independent arches, on ogival arches (from *augere*, to increase, *i. e.*, increasing the strength of the vaults), stones of small dimensions were used for the purpose. Vaulting on independent arches constitutes the very essence of the system of building absurdly called Gothic and which ought to be called the "French" style, for it came into existence in the Isle of France and its finest examples are to be found in France.

In the Isle of France the builders had stone of first-rate quality at their command. All the principal edifices of the twelfth century and the early part of the thirteenth were built of stone. So excellent was the Gothic system that its forms were adopted throughout Europe. First England, then Germany and then Italy copied the new style from France and applied it in their own ways. The Italians, who on various occasions used brick instead of stone, lacked the frankness to avow it, and covered the walls with a plating of marble, as can be seen in the case of the Florence Cathedral, for instance, which is completely clothed with slabs of black marble and white, the commonplace arrangement of which causes one to think of a set of gigantic dominoes.

In the southwest of France brick has always been the favorite material. No good building stone is to be found there, and besides in the Middle Ages the means of transport were very inadequate, so that it was necessary to be content with the materials that were near at hand. The admirable Romanesque architecture at Toulouse and in fact in all the southwest is in brick. Saint-Sernin, the only Romanesque church with five naves, is constructed in brick.

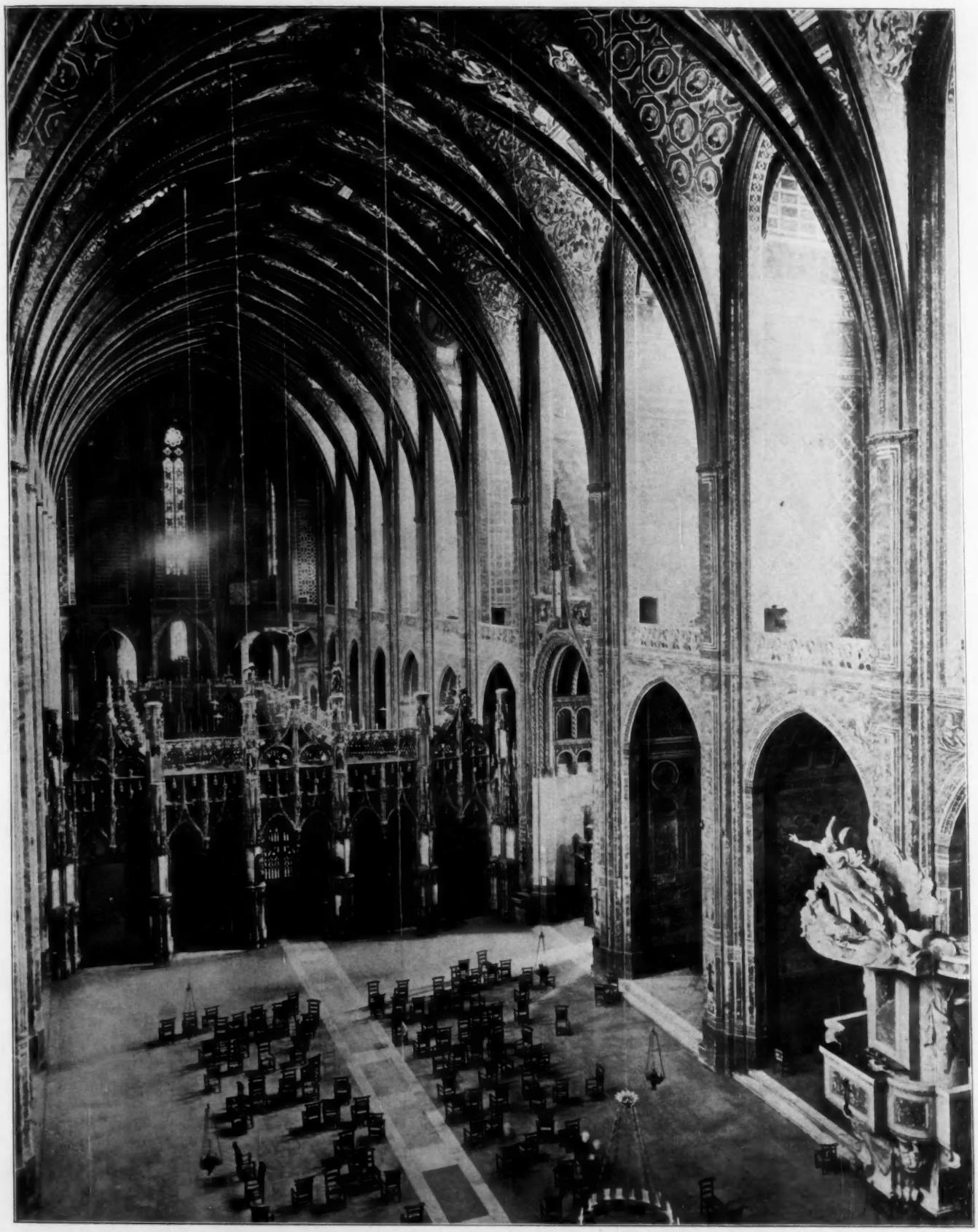


SAINT-CECILE'S CATHEDRAL, SOUTH SIDE, ALBI.

We know how this part of France was ravaged by the religious wars. After the great expansion of Romanesque art a series of calamities afflicted this unfortunate region, and no sooner had religious strife ceased than the Hundred Years' War broke out between France and England.

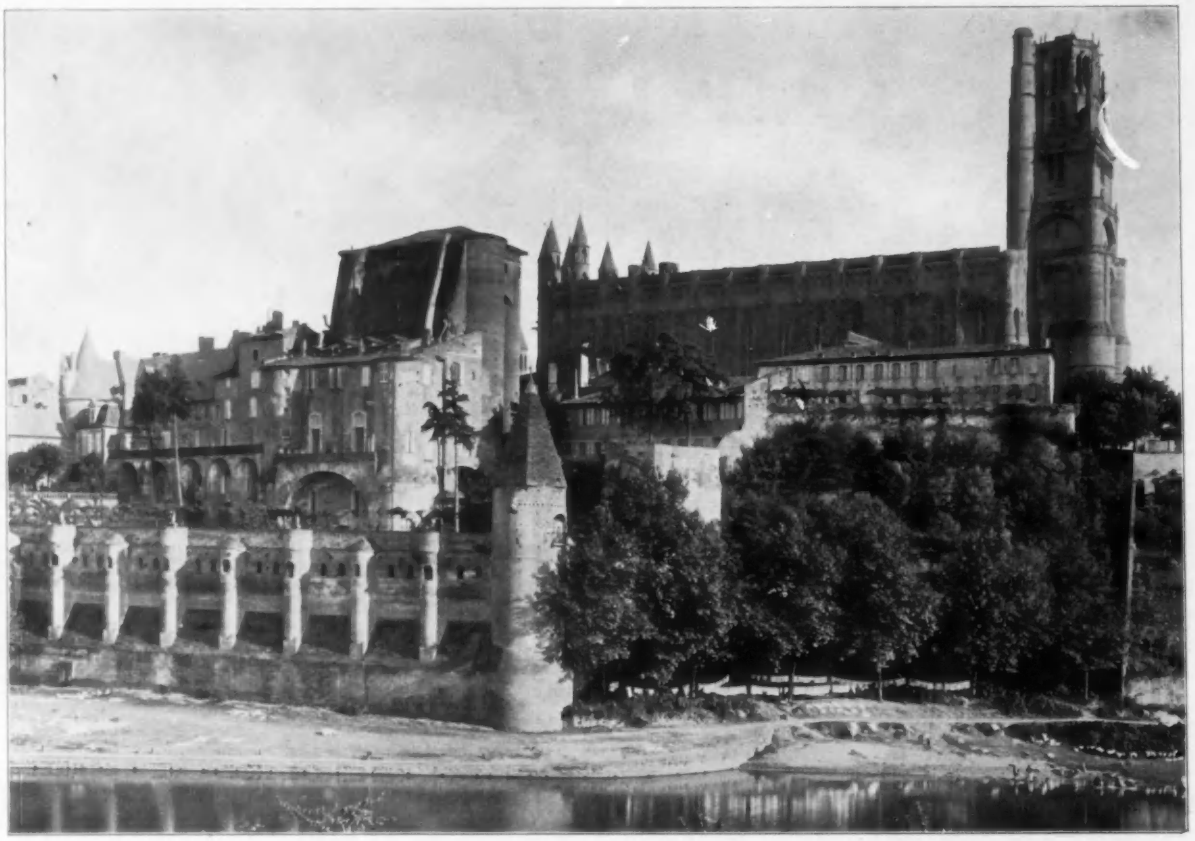
The troubles of this period had a great influence upon the development of architecture in the southwest. Almost all the churches in that part of France were fortified, and even the smallest village protected itself by a wall. Fortified, too, was Saint-Cecile's Cathedral at Albi, which we now introduce to the readers of THE BRICKBUILDER.

This building was begun at the end of the thirteenth



INTERIOR OF NAVE, SAINT-CECILE'S CATHEDRAL, ALBI.

century, Bernard de Castanet having laid the first stone thereof on the fifteenth of August, 1282. The work of erection was carried on very slowly, with occasional stopping appearance presented by this cathedral-fortress. Located in the very heart of the region where the most formidable outbreak of heresy of the Middle Ages took place,



SAINT-CECILE'S CATHEDRAL AND ARCHBISHOP'S PALACE, ALBI.

THE ARCHBISHOP'S PALACE, ALBI.

pages. Two centuries later, namely in 1480, the church was consecrated, but the building was not entirely completed until the year 1512.

The various views which we reproduce show the strik- and erected at a time when the war between France and England was covering French soil with ruins, it has not, as far as its exterior goes, any of the graces of pointed architecture.

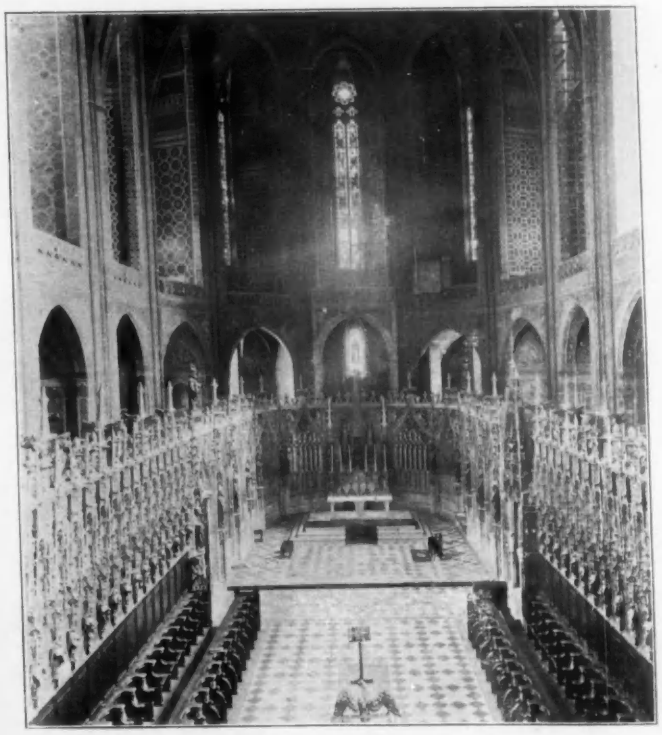
SAINT–CECILE'S CATHEDRAL, ALBI.

The walls are flanked at regular intervals by towers, the windows are narrow and placed high above the ground, while a gallery with machicoulises runs round the edifice. The five towers at the apse are crowned by sentry boxes. In front there is a square bell-tower which with its massive corner turrets is more like a dungeon than the tower of a church. This tower rises to a height of 74 meters; at the top there is a platform 64 square meters in area. It is only at the height of thirty meters from the ground that this tower assumes an appearance of lightness and elegance and is pierced by elongated bays.

The different views of the cathedral enable the reader to see the beauty of the bond and the masterly way in which brick was employed by the builders of the Middle Ages.

Here, as almost everywhere in the south of France, a brick of somewhat large dimensions was used. It is almost square, measuring 13 inches by 10, with a thickness of 2.4 inches. The mortar is of excellent quality and the mortar bed particularly thick.

Thus Albi Cathedral is noticeable for the severe plainness of its walls, for its series of towers and for its narrow bays. No counterforts are to be seen, no buttresses for the enemy to damage. It is certainly a thorough cathedral-fortress, and one cannot help admiring the fine



INTERIOR OF CHOIR, SAINT–CECILE'S CATHEDRAL, ALBI.

GATE, DOMINIQUE DE FLORENCE, SAINT–CECILE'S CATHEDRAL, ALBI.

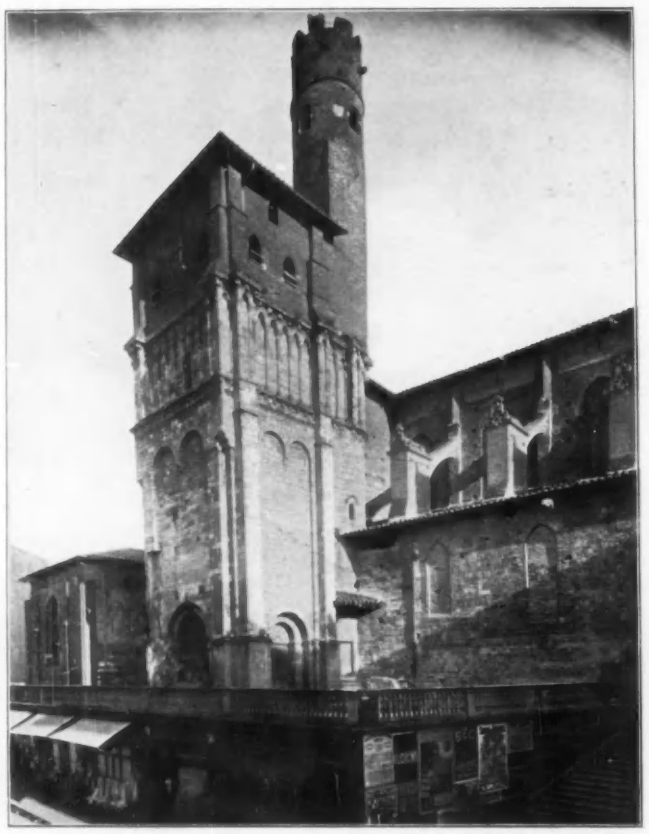
architectural arrangement of the work. The lateral faces and the apse deserve to rank amongst the best examples of Gothic buildings, and can lay claim to a foremost place in the history of edifices in brick.

In the beginning of the fifteenth century a charming doorway was added on one of the sides, after a design by an Italian, Domingo di Fiesole. This was done at a period when monumental statuary was flourishing again in a magnificent manner on the walls of the French cathedrals. As regards the necessary statuary, this doorway, as can be seen, was constructed in stone.

On going inside the cathedral we are struck by the astonishing richness of the decoration. The architects made up for the absence of ornamentation without by bestowing a profusion of it within. Albi Cathedral, though utterly bare outside, is one of the most remarkable in

France as far as its internal decoration is concerned. Architecturally its arrangement is interesting. It has only a single nave, a very wide one, and the counterforts and other buttresses which, as we have said, could not be placed on the outside, are placed inside those turrets whose picturesque effect we have noticed. This is an ingenious arrangement.

In the next place we must mention the evidences of the survival of Roman methods of building. The vaults are built by concretion; they are massive, and only the revetment panels are in the Gothic style. In the fifteenth century an extremely rich rood screen in stone was put up for the purpose of separating the choir from the nave. It is one of the most celebrated screens of the period. The sculptures on the choir stalls are equally remarkable.



CHURCH OF SAINT-SALVY, ALBI.

The vaults are entirely covered with frescoes consisting of gilded arabesques standing forth on a sky-blue ground.

Thus Albi Cathedral presents the piquant contrast of a plain, military exterior and an interior of dazzling richness.

We have grouped around the cathedral a few views of Albi, which possesses numerous fine mediæval buildings in brick. One of these views shows the river, the old brick ramparts, the archbishop's palace, and at the top of the city the cathedral. Another illustration gives a near view of the archbishop's residence, a noteworthy construction in brick. Like the neighboring cathedral, it is solidly built and in appearance bears a close resemblance to a dungeon. Lastly, the Church of Saint-Salvy, also partly built of brick.

Robbia Pavements. II.

BY ALLAN MARQUAND.

THE PAVEMENTS OF LUCA DI ANDREA DELLA ROBBIA.

VASARI informs us in his life of Luca della Robbia that the younger Luca, son of Andrea and grandnephew of the elder Luca, was most active in the production of works in glazed terra-cotta, and that he made for Pope Leo X pavements for the loggie of the Vatican under the direction of Raphael, as well as pavements for various other apartments in which he placed the insignia of that pontiff. These pavements doubtless centered in Bramante's buildings about the Cortile di San Damaso. There still remain some tiles in the rooms known as the Greek and the Secret Libraries on the ground story. As similar tiles are supposed to have been used in the first loggia and the Borgia apartments, the new pavements of the Sale Borgia have been made in accordance with this pattern. Giovanni Tesorone, to whom the restoration of the Borgia pavements was intrusted, considers them to have been made in Perugia or Deruta or some other Umbrian town. They are published by Paul Fabre in the *Mélanges d'Archéologie et d'Histoire* of the French School for 1895. They have little in common with Robbia designs.

The tiles for the second loggia, known as Raphael's loggia, were undoubtedly made by Luca della Robbia the younger. This we know not only from the statements of Vasari in his lives of Luca della Robbia and of Raphael, but also from the official archives from which the following entries are published by Müntz in his *Raphael*, page 452, note 1: "*1518, 5 Agosto. E più a mo Luca de la Robia che fa el pavimento de la gran logia per parte di pagamento ducati 200. 1518, 10 Settembre. E più al frate de la Robia, per el pavimento ducati Venticinque.*" These entries raise some difficulties in interpretation. Is the Luca of the first entry the same person as the *frate* of the second? Or are they different persons? Whichever alternative we select, we do not leave the difficulty completely solved. It is perhaps best to assume that the younger Luca was the individual by whom the pavement was made. Fra Ambrogio della Robbia seems to have acted as fiscal agent for his father in connection with the lunettes made for Santa Maria della Quercia at Viterbo, and possibly performed the same offices for his brother Luca when the latter was away from Rome.

Within the memory of living persons the pavement of the loggia of Raphael was still *in situ*, though much effaced. But now its last vestiges have been removed. Is it possible for us to restore its appearance to our imagination?

An important step in this direction has been taken by Giovanni Tesorone in a pamphlet entitled *L'Antico Pavimento delle Logge di Raffaello in Vaticano*, Naples, 1891. He not only searched the Vatican for existing remains of pavements, but gathered from an aged custodian, Achille Costantini, and from Professor Mantorani their recollections of the now vanished pavements. In his search of the Vatican apartments he discovered, in a room adjoining the Sala dei Chiaroscuri, a pavement in fairly good state of preservation. In the center was a medallion containing the insignia of Leo X. This was on a ground

of lozenge-shaped tiles, colored green and blue and yellow, arranged so as to give the appearance of a reticulated system of cubes. This design was common property of the Robbia school. The outer border is a Greek meander with insignia of Leo X. There is nothing here that suggests design on the part of Raphael. This is probably one of the pavements adorned with the insignia of Leo X of which mention is made by Vasari.

Tesorone attempts to restore to our imagination the pavement of Raphael's loggia. On the center of each compartment he places a medallion with the papal arms set in a general ground of plain blue tiles. The border is a narrow one, consisting of two intertwining oak branches of green, which enframe a series of yellow-edged violet disks. Border tiles of this character were found in one of the corridors of the Vatican, and are now preserved in the Borgia apartments. This border reminds us of Florentine designs by the elder Luca, although the *rovere*, or oak branch, appears in decorations of the Vatican made by Roman artists in the time of Julius II. The long corridor of the loggia is divided into a series of bays by means of broad pilasters which mark the divisions of the vaulting compartments of the ceiling. Extending across the corridor from the outer to the inner pilasters were on the pavement broad bands of tiles which separated the nearly square compartments of the pavement. These broad bands Tesorone restores as ornamented by four green oak stems or branches forming a braid with square openings, in the centers of which were violet disks. This quadruplex braid is somewhat complicated, but is analogous to the two-strand braid of the narrow border. If Luca the younger might naturally have been the author of the square compartments, it seems unnecessary to suppose that he should have called upon Raphael to design the broad dividing bands.

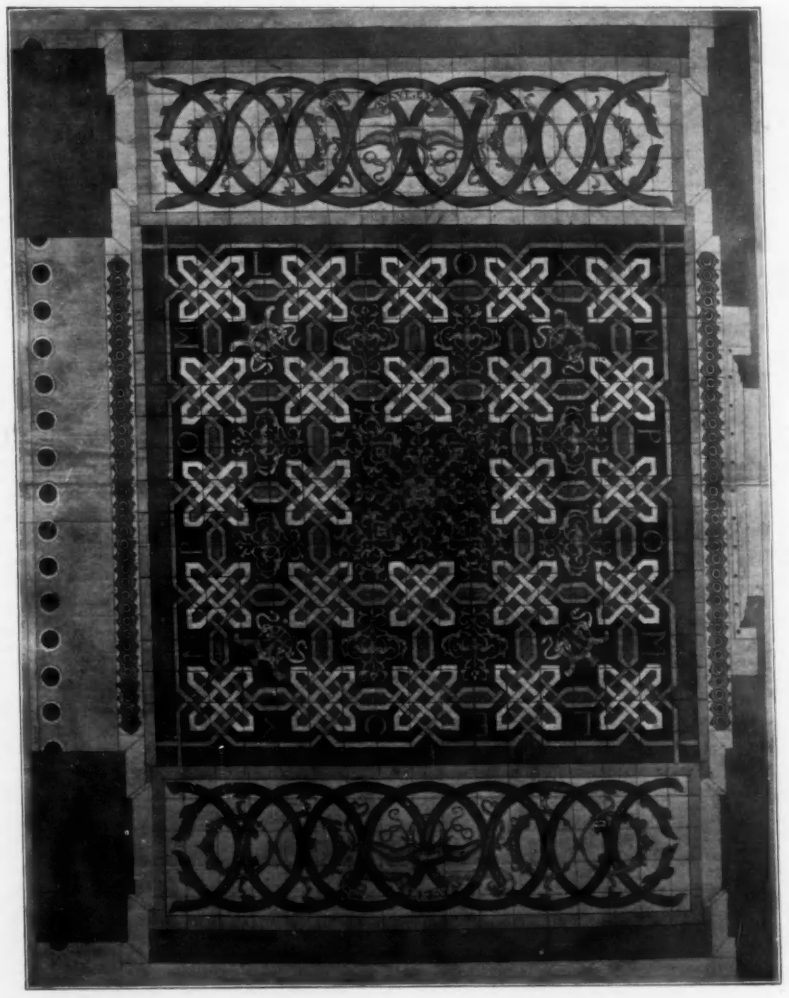


FIG. 1. PAVEMENT FROM RAPHAEL'S LOGGIA OF THE VATICAN BY LUCA DI ANDREA DELLA ROBBIA. FROM A DRAWING BY FRANCESCO LA VERGA, 1742.

There is a document, apparently unknown to Tesorone, which removes the design of at least a portion of this pavement from the region of hypothesis to that of certain fact. This is a drawing made by Francesco La Vega, a Spanish painter, in 1742 and preserved in the Vatican Library. A photograph of La Vega's drawing, by Tuminello, was published by Emma Perodi in the first volume of *Arte Italiana Decorativa e Industriale* (1892), and is here reproduced (Fig. 1). The drawing was a pen and wash drawing and was one of a series presented by Cardinal Silvio Valenti Gonzaga and his nephew under the title "*Disegni della prima e seconda Loggia Vaticana fatti da Francesco La Vega, pittore Spagnuolo, anno 1745, per ordine ed a spese dell' E^mo^ Signor Cardinale Silvio Valenti Gonzaga, Segretario di Stato della S. M. di Benedetto XIV e dell' E^mo^ nipote di lui Cardinale Luigi bibliotecario di S. E. e protettore della Biblioteca Vaticana, donati a questa l'anno 1802 nel giorno medesimo nel quale n'ebbe il solenne possesso.*" The date 1745 represents evidently the date when this series of drawings was completed. The drawing displays one compartment of a pavement with its broad dividing bands. On these lateral bands the design consists of a quadruplex braid of *rovere* branches intertwined with Medici rings and the yoke with Leo's motto, *Suave est* (*jugum meum*). The central compartment has on two sides a narrow border of a two-strand *rovere* braid, and in the interior an elaborate design consisting of a system of interlacing bands such as Italian and Saracenic designers alike derived from Byzantine sources. Between these geometric patterns is an elaborate arabesque such as we see on Italian Renaissance pottery and which would have brought the pavement into harmony with Giovanni da Udine's elaborate stuccoed ornamentation of the loggia. Near the four angles of the square are Medici rings combined with Medici plumes and the motto *Semper*. Near the border is inscribed "Leo X M[edicis] Po[ntifex] M[aximus]." If it be true as Vasari in his life of Ra-

phael states, that these pavements were ordered from Florence, then such a design as this may well have been furnished by Raphael or by one of his assistants. But it seems more probable that Luca della Robbia the younger came to Rome and made these various pavements, and at the same time the large medallions with papal insignia now in the Museo Industriale in Rome, perhaps also the medallions and pavements at the Monte Oliveto in Naples. That La Vega's design represents the real pavement seems to be substantiated by fragments of tiles still existing and exhibited in a case in the Sala Borgia. There are here exposed two tiles about 0.20 m. square with Leo X insignia. One contains the ring and feathers, the other the yoke. These two tiles correspond in size and design to the tiles discovered by Tesorone in the room near the Sala dei Chiaroscuri. The remaining tiles in the case are somewhat larger, measuring as nearly as I could estimate about 0.225 m. square. In design, four correspond with La Vega's drawing of the central compartment and exhibit parts of the braided bands, one with his representation of the narrow border and one corresponds in general, though not absolutely, with his reproduction of the broad band between the pilasters. According to Tesorone it would require seventeen tiles measuring 0.227 m. square to reach from pilaster to pilaster across the corridor. It may be noticed that precisely this number of tiles appears in this position in La Vega's drawing.

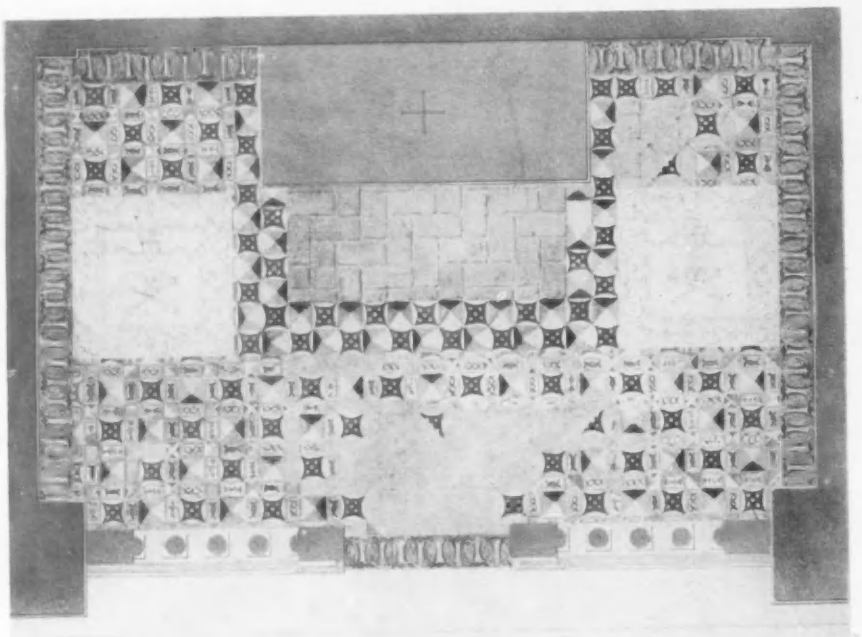


FIG. 2. PAVEMENT IN THE SAN SILVESTRO AL QUIRINALE, ROME, BY LUCA DI ANDREA DELLA ROBBIA. FROM A DRAWING BY COUNT VESPIGNANI.

From the fragmentary tiles preserved in the Sala Borgia we may obtain a partial notion of the coloring of the pavement. In the central compartment the general ground was blue and the interlacing network yellow, and in the broad dividing bands between the pilasters green *rovere* branches appeared against a white ground, and the whole was framed in yellow. The narrow *rovere* braids on the other two sides of the central compartment are clearly to be reproduced from existing tiles. Here two green *rovere* branches were braided against a white ground, showing a series of violet *oculi*, each of which is framed with a circular band of yellow. We may infer from the drawing that yellow was the color used for the arabesques and inscriptions, and that white was employed for the Greek crosses which appear at regular intervals and form one system with the interlacing yellow network. The tiles from the Sala dei Chiaroscuri, the medallions in the Museo Industriale and other tiles in San Silvestro al Quirinale enable us to determine the coloring for the Medici insignia. We cannot be far wrong, therefore, if we restore the rings in yellow, the feathers maroon, white and green, and the motto *Semper* black on a white scroll. Thus the entire color scheme may be reëstablished with almost absolute security.

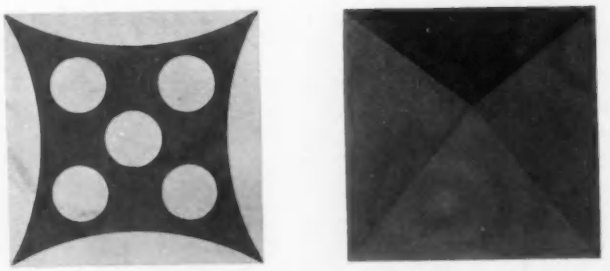


FIG. 3. DETAIL OF PAVEMENT IN SAN SILVESTRO AL QUIRINALE.

Tiles which would seem to have been made by the younger Luca della Robbia may still be seen in at least two other places in Rome — in the Pantheon and in the church of San Silvestro al Quirinale. The tiles in the Pantheon are to be found in a dark stairway which starts from the porch and leads up to the rooms of the Accademia di San Luca. These tiles, though set in the floor, serve no useful or decorative purpose. They are evidently mere mementos transported thither after they had exhausted their usefulness elsewhere. There are seventeen of these tiles preserved in whole or in part. They measure 0.28 m. square and are decorated with green *rovere* designs on white ground. Here and there remains a blue border. The *rovere* design does not follow curved lines as in La Vega's drawing, but straight lines with angles. These tiles are larger than those preserved in the Sala Borgia and are not adapted for the dimensions of the Vatican loggia.

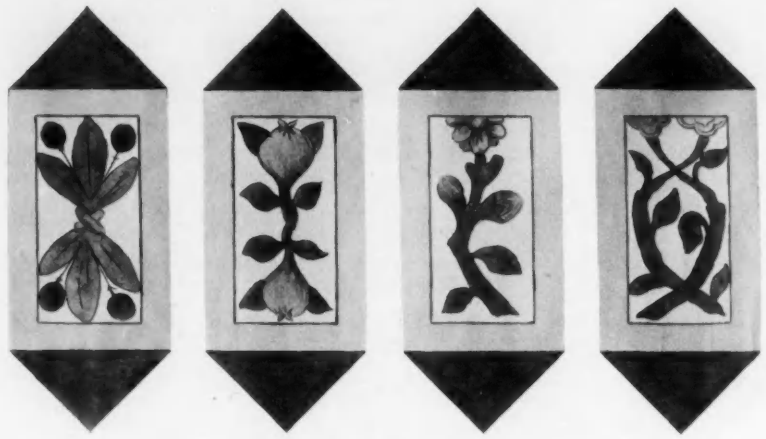


FIG. 4. DETAIL OF PAVEMENT IN SAN SILVESTRO AL QUIRINALE.

In color and design, however, they are not far removed from the pavement of Raphael's loggia, and may well have been removed from some apartment of Julius II or Leo X.

The tiles at San Silvestro al Quirinale are arranged as a pavement in the Cappella Santa Caterina, where was buried Frate Mariano Fetti, a follower of Leo X. The tiles are noticed by Professor Gnoli in an article entitled "Raffaello alla Corte di Leone X," published in the *Nuova Antologia* for 1888, also in an article on "La Cappella di Fra Mariano del Piombo" in *Archivio Storico dell' Arte* for 1891, and again by Professor Tesorone in the pamphlet above mentioned. The very beautiful drawings here reproduced (Figs. 2 to 6) were executed by Count Vespignani, architect to the Pope. The border consists of a series of interlocking Medici rings, with the diamonds pointing alternately up and down. Behind each ring are the three Medici feathers, green and white and maroon. The background on some of the tiles is green and on others blue. Viewed as a whole, it is evident that these tiles were not originally designed for the space they now occupy. At the angles of the pavement the tiles do not unite naturally, but have been cut down to fit the new position. The number of tiles with the blue background is larger than that with the green, and these two varieties are arranged without reference to each other. When shown these tiles Costantini recalled that some of the compartments of pavements of the loggia had borders of this design instead of the two-strand *rovere* braid. He recognized, however, that these tiles are smaller than those which occupied a similar position in the loggia pavement. The central compartment consists of square tiles surrounded by oblong tiles. The square tiles are considerably smaller than the border tiles, measuring only 0.125 m. They are ornamented either with blue Medici diamonds or with five white Medici disks upon a blue background. The smaller tiles are decorated with intertwining fruits, flowers, feathers and *rovere* branches or rings.

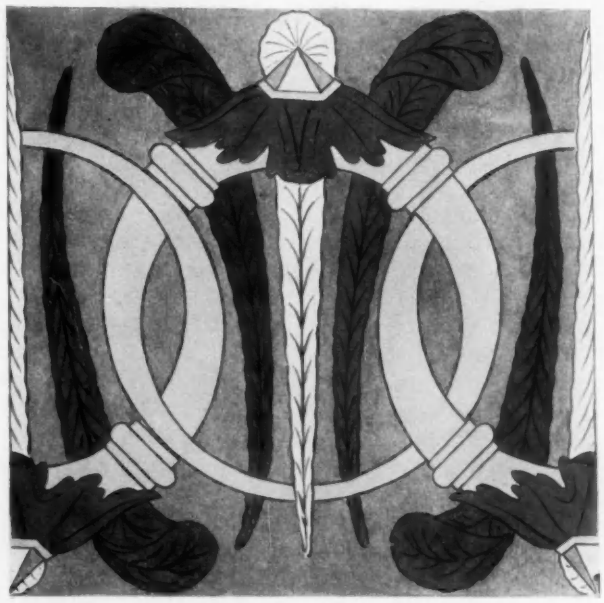


FIG. 6. DETAIL OF PAVEMENT IN SAN SILVESTRO AL QUIRINALE.

It seems evident that these tiles were made originally for Leo X or other member of the Medici family. In color, in design, in technique they betray the workmanship of the younger Luca della Robbia. We cannot be far wrong in supposing that they also were made for some room in the Vatican.

If we consider as a whole the information we have been able to gather concerning the Vatican pavements, we cannot be far wrong in concluding that the designs, as well as the execution, are to be ascribed, not to Raphael, as is popularly supposed, but to Luca di Andrea della Robbia.

An account of the Robbia decoration of the Innocenti and the San Paolo Hospitals in Florence, and the Ceppo Hospital at Pistoia, will be given in another article.

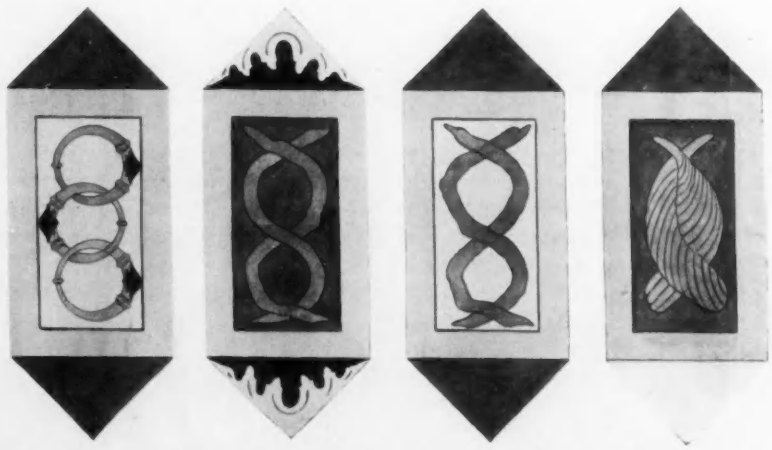


FIG. 5. DETAIL OF PAVEMENT IN SAN SILVESTRO AL QUIRINALE.

The Permanency of Steel Skeleton Construction.

BY J. K. FREITAG.

A FEW weeks ago, in an address before the Chicago Real Estate Exchange, General William Sooy Smith, member Western Society of Engineers, gave some opinions regarding the probable life of steel buildings, which, on those at least who are unfamiliar with the subject, or even on architects and investors who have attached no importance to questioning the permanency of our present methods of construction, must either have made a great impression or else have been soon dismissed as the visionary opinions of an alarmist.

But, unfortunately, even if one cannot agree with many of General Sooy Smith's deductions or with his apparent distrust of the majority of steel-constructed buildings, his warnings are only too well founded in many particulars, and his criticism cannot be met by simply ignoring the points at issue or by disregarding statements. It will therefore be the object of this paper to consider General Sooy Smith's opinions, and to see what assurances, if any, may be found to justify the better methods of present-day steel skeleton construction, and to ascertain what causes, if any, contribute to rapid or alarming deterioration.

Evidently what General Sooy Smith intended principally to emphasize was the distinction between cheap and wretchedly poor steel building construction, built for immediate profit only, without regard for the future, and structures which are built with care upon as accurate and scientific knowledge as may be possible to derive from past experience and conservative practice. General Sooy Smith drew attention, as he has done before, to the great difference, in the probable ultimate life and safety, between a steel skeleton building of good and careful construction, in which the metal framework is given adequate initial protection against rust or other deterioration, as well as permanent protection by means of adequate coverings of cement masonry, and those other buildings which receive little or no early consideration as to the quality or protection of the metal work, and which are then covered up by inadequate envelopes which hinder inspection without accomplishing their protective functions. It was stated that the first class of buildings was good for a life of two thousand years, while in the latter and probably much more numerous class deterioration proceeds with such rapidity that failure may be expected at any moment, or certainly within a very few years.

We have not seen any published account of General Sooy Smith's remarks which gives either the authority for his opinion that steel imbedded in cement masonry will safely withstand for two thousand years the corrosive tendencies incident to our modern methods of buildings, or his investigations of existing structures which reveal such rapid and dangerous decay or deterioration as to warrant the belief that many structures stand by the barest possible margin of safety, and that they are on the verge of collapse at any time. It would certainly be interesting and of great scientific value to know the precise facts or experiments upon which such statements are founded; but the writer believes that it is impossible at the present time to prove either of these extreme positions *as applied to modern conditions*. From certain known facts under *other* conditions, and from certain partial deductions drawn from the range of a comparatively few years, it will be safe to assume that certain buildings, built with all due regard to this but imperfect knowledge, are secure and reasonably permanent; while others, built with little or no thought of permanency beyond the time necessary for the mere building operation and the subsequent sale or transfer to other hands, may properly be questioned and looked upon with deserved distrust.

It has been said that the ultimate life of steel buildings under modern conditions is not calculable, and this does not overlook the possible, but very improbable, actual immediate investigation of all steel skeleton buildings which have been built perhaps fifteen or twenty years.

Such an examination would prove the safety or danger at the present time of the *structures examined*, but of those built very recently the elapsed time has been too short to warrant any absolute conclusions, and to judge present methods of construction by deductions drawn from earlier and different constructions would be manifestly unfair. Many improvements differing radically from earlier methods would be sufficient to change entirely the power to resist corrosion or deteriorating influences. The absolute result is therefore to be had with time only.

It may be urged that the action of other metallic structures, such as bridges, viaducts, piers, etc., may be taken as sufficient basis upon which to work, but this is a comparison of little value, due to the great difference in the character of the exposure. Any and all experience gained from a study of bridges or other metallic structures is of undoubted value as fixing their action and wear under the various circumstances in which they were used, but the deteriorating conditions in buildings are of a different character, and it is therefore reasonable to presume that the effects may be different in both kind and degree.

Bridges are always open to inspection, and repainting is an easy matter as soon as traces of rust are discovered. Such structures are also subject to alternate wetting and drying, rains, fogs and severe heat and cold. Are these conditions more or less severe than those affecting the framework within a building? In the latter class of structures the steel is covered from sight, and frequent inspection or repainting is impossible; but while the temperature is probably much more even, no winds or circulating air act to dry the moisture which may be constantly penetrating the envelope after each rain or storm.

It has also been stated that whereas engineers usually count on an average life of about forty years for bridges, etc., with their accessibility for inspection and repainting, a life of much more than forty years is expected of buildings, without the possibility of inspection or renewal. This is not a fair comparison, as the length of life in our bridges and viaducts has been determined rather by the great increase in rolling loads and the attendant overstraining of the parts than by causes of deterioration.

Assuming now that the more alarming conditions of

which General Sooy Smith speaks are true, — and it is to be supposed that actual investigations are the cause of so radical a statement, — it might be well to consider the probable effect arising from the possible collapse or even partial failure of some great steel skeleton building. It is to be devoutly wished that actual investigations by individual owners be at once undertaken, but it is to be feared that such a proceeding, involving even a most moderate expense for removing a few of the column coverings in the lower story or stories, would seem a useless expenditure to owners who begrudge such inexpensive and yet such vital initial features as adequate inspection and painting for the steel frame. Such an investigation would be a comparatively simple matter, involving as it would only the uncovering of a few typical members of the construction in any locations or under any special conditions which it might be thought would be especially liable to show more marked effects in deterioration. This could be accomplished with little or no fear of criticism or apprehension on the part of tenants; and while investigation might only serve, as the writer believes it would, to increase the faith or to quiet the fears of owners of good buildings, it *might* also serve to show the owners of a different class of structures the folly of a penny wise, pound foolish policy which could better be corrected at once than after some dire calamity had thrown distrust upon all steel structures.

Let us now consider some definite criticisms which have been made against skeleton construction and some actual cases of the deterioration or preservation of metal work which intimately bear upon this discussion.

First, as regards the recent criticisms by General Sooy Smith, something more definite to work upon than his late opinions may be found in a paper which he delivered some years ago before the Western Society of Engineers.* From that article we quote as follows:

"The rate of corrosion of iron and steel varies greatly under different circumstances. In pure water containing no free air, with an air-tight covering of paint or imbedded in quicklime, it scarcely corrodes at all, but when in the open air, particularly when alternately wet and dry, it rusts quite rapidly, and when exposed to steam and sulphurous fumes it is eaten away by corrosion at the rate of one-eighteenth of an inch per annum, as was the case in the floor system of the viaduct in Milwaukee Avenue, Chicago, under which locomotives were passing frequently; and corrosion at the same rate occurred in a portion of the western approach of the Eads bridge at St. Louis, where the same circumstances exist.

"As the metal in a steel column is usually not more than one-half inch thick, corrosion at the above rate would make a steel building unsafe in less than twenty years.

"In an iron or steel skeleton building the columns starting at the basement floor or at the floor at street level extend to the top of the building. They are hollow and painted only on the outside and this with paint that is so perishable that it will afford no protection from corrosion after the first five or ten years. The girders are nearly as much exposed as the columns, while the beams are generally bare on the top and bottom surfaces of the flanges and sometimes over a considerable part of the webs."

Now, as we have seen, it is manifestly unfair to make any comparison between the rates of corrosion for viaducts over railroads and for buildings, but here we seem to have one of the principal arguments upon which General Sooy Smith bases his prediction of failure of buildings "in less than twenty years." Again, the mention of floor beams which "are generally bare on the top and bottom surfaces of the flanges and sometimes over a considerable part of the webs," and the mention of columns which are assumed to be protected by a doubtful coating of paint only, indicate most exceptional practice, if indeed precisely such cases could be found.

Examples from building practice of actual corrosion have from time to time been brought to public attention by architects and engineers, notably in discussions on the permanency of skeleton construction before the American Institute of Architects * and before the American Society of Civil Engineers.† In the former instance the principal example of corrosion was cited by Mr. Post, where the condition of certain beams taken from the old New York Times Building was mentioned. These iron beams, which had been in use some twenty-five or thirty years, had carried brick arches over a boiler room and kitchen, and the *unprotected lower flanges*, exposed to the action of steam and cooking gases, were found to be nearly destroyed, while the corrosion had also extended upwards between the iron and brickwork until the beam webs were almost entirely worthless.

Other similar instances of corrosion were brought forward at this discussion, and, without a single exception we believe, their *unprotected* condition could lead to nothing but deterioration sooner or later. But such examples as these are about as worthless as the comparisons to railroad viaducts, and that Mr. Post attached no importance to the action of such unprotected members may be judged from his later statements before the American Society of Civil Engineers, when he said:

"While the speaker was not a great admirer of steel in concrete, the evidence of the last few years seemed to him to prove forcibly that where iron or steel is in direct contact with masonry it is thoroughly protected from corrosion. In pulling down the first Herald Building, which was over thirty years old, he directed the inspector to bring him the worst corroded pieces of iron he could find in the building. There were no bad examples found, and where the mortar had been in absolute contact with the paint, the paint itself was preserved. All the reliable evidence obtainable goes to prove that cement mortar has the faculty of preserving iron and steel to a great extent from corrosion, and certainly of preserving from injury the paint which it covers."‡

Such testimony as this from the very wide experience of Mr. Post, and the testimony of others who have cited remarkable instances of the preservation of iron within cement or concrete, — as, for instance, Mr. W. L. B. Jenney, who mentions the excellent condition in which

* See "Fireproof Construction and Prevention of Corrosion," by General William Sooy Smith, "Journal of the Western Society of Civil Engineers," April, 1898.

* See THE BRICKBUILDER, November, 1894.

† See "Transactions American Society of Civil Engineers," Vol. XXXV.

‡ See "Transactions American Society of Civil Engineers," Vol. XXXV, p. 472.

a piece of iron was found after being imbedded some one thousand years beneath the Egyptian Obelisk now in Central Park, N. Y.; and the practically perfect condition recorded of iron after a four hundred years' entombment in cement concrete beneath water,— such testimony must show that the reasonable permanency of the better class of skeleton construction is not only possible but probable. While this may not be susceptible of actual proof, it will still be a pretty safe guide to follow well-proven facts regarding the known actions of iron or steel under certain conditions; and if all causes are avoided which have apparently produced bad effects, and other examples of unquestioned preservation are profited by, there would seem to be little doubt that the result will be a permanency equal to the space of time within which any building would naturally outgrow the usefulness for which it was erected. What these well-proven facts seem to establish we will now briefly enumerate.

First, as to the causes of corrosion or deterioration. From the very beginning of service all metals suffer a diminution of strength, however slight or slow in action, due to the corrosive or deteriorating influences of moisture, deleterious gases, vibrations or shocks, or possibly electrolysis. These influences may be initial— that is, existing only or with greatest force at the time of placing in position — or permanent or progressive, due to the continued conditions during use. It must also be remembered that initial rust will almost certainly lead to permanent and progressive rust.

The question of vibration or shock is not pertinent to this article, while electrolysis is only vaguely to be estimated and is also questionable in degree or importance. The principal deterioration to be feared is therefore rust, due either to lack of initial protection of the steel work, to moisture arising from the employment of mortar during building or to moisture which either penetrates the protective coverings during service or else emanates from piping within the structure.

Considering now the phenomenon of rusting, we know that iron and steel are but very slightly oxidized or rusted under the action of pure air or pure water, but when the air becomes moist so that it condenses on the surface of the metal, or when water becomes impure or acidulated, oxidation is speedily established, and when once started the ultimate destruction of the metal is assured unless the process is arrested.

As to the materials ordinarily employed, — iron, steel, stone, brick, terra-cotta, concrete, lime or cement mortar, — if these can be so selected as to better withstand corrosion or be less liable to promote corrosion in other materials, the initial choice is as important as later considerations of protection.

It is now generally considered that under usual conditions the corrosibility of cast iron, wrought iron and steel will be about the same. Under very trying conditions, as for instance in salt water, cast iron will show the best results, but in protected building work the reliability of steel far offsets any possible slight advantage which cast iron might possess in the power of endurance.

In selecting the class of masonry or terra-cotta to be used it should be remembered that limestone must never be employed in locations where there is any possibility of contact with the steelwork or where moisture could penetrate the joints and then reach the steel frame, for experience has shown that anchorage cables of suspension bridges have been badly corroded and even entirely severed where imbedded in limestone masonry or concrete made with limestone. If limestone is used, a thick layer of cement mortar should first surround the metalwork. Brickwork should be built of dense and hard brick with a vitrified appearance and with a minimum of soluble salts. Terra-cotta protections should preferably be of a porous variety,* both on account of the ready evaporation of moisture from the mortar used in setting and the evaporation of penetrating dampness from without, to say nothing of fire-proofing qualities. Regarding lime *versus* cement mortar there are great differences in opinion. Many claim that lime mortar is an excellent preservative of steel, and this opinion is believed to be substantiated by examples. Other authentic cases, however, tend to show that, under certain conditions at least, lime mortar is not to be depended upon. On the other hand cement mortar or concrete is now generally regarded as a most perfect conservator of iron and steel. Mr. Post's conclusions as to cement mortar have been previously quoted, and Mr. J. Newman† states that "iron imbedded in properly made and mixed water- and air-tight Portland cement concrete has not yet been shown to rust, and the preservative effects of such concrete may be considered to be established, provided the surface of the metal was clean and dry on the Portland concrete coating being applied and free from corrosion."

Proper materials, however, may be rendered nugatory through improper usage. A few words, therefore, concerning the methods of use to secure both initial protection and permanent effectiveness.

When delivered from the rolls which form them to the cooling beds all steel plates and shapes are largely covered with scales which are only partially attached to the surface and hence form cracks for the ready formation of rust. If such plain material is then handled or stored out of doors before being painted, rust will quickly start beneath the scales, and if allowed to become well developed any subsequent painting will never arrest the oxidation which proceeds under cover of the paint. The first essential, therefore, for effective painting is the early removal of all mill scale, rust, grease, etc., and here the services of a careful mill or shop inspector are worth the entire charge made for inspection. A coat of pure boiled linseed oil is generally specified for the material before shipment, to be followed as soon after erection as practicable by at least two coats of different colors of almost any of the better grade paints, oxide of iron, red lead, asphalt or graphite paints, *provided the oils and pigments used are of the best quality*, and provided the painting is done in dry weather on dry surfaces.‡

In designing the steelwork a minimum area should be presented to corrosive influences, as the ratio of exposed surface to sectional area largely determines the amount of

* For reasons, etc., see the author's "Fire-proofing of Steel Buildings," pp. 115 to 118.

† See "Metallic Structures: Corrosion and Fouling and their Prevention."

‡ For a more extended discussion of paints and painting see the author's "Architectural Engineering," revised edition, 1901.

the corrosion. The practice of using very thin columns of large areas in exterior walls, like vertical plate girders, is to be avoided, as this presents large areas to exposure and possible corrosion. Columns should be as compact as possible, open where practicable, in order that all surfaces may be protected. When used in closed or boxed section the interiors should be filled with cement mortar or concrete.

In using masonry or terra-cotta envelopes or coverings, either exterior or interior or around foundation members, the function of excluding all possible moisture or air should be borne in mind. The masonry should be thick enough, laid in cement mortar, all joints carefully laid and repointed from time to time, and where in contact with the steel a heavy coating of cement mortar, asphaltum or other impervious covering, preferably a casing of hollow terra-cotta laid in cement mortar, should first surround the metalwork. Floors should protect the entire beam or girder surfaces, the upper and lower flanges as well as the webs; column coverings should extend from floor to floor without any holes or openings at the various floor levels; and in fact every precaution should be taken to surround the steelwork with as air- and water-tight a covering as possible, this covering to have some acceptable material everywhere *in contact* with the metal frame. Architects Holabird & Roche, who have designed many notable high buildings in Chicago, state as the result of their extended practice: "We have found that in fire-proofing, wherever the terra-cotta shapes are so arranged that the entire surface of the beams, girders, columns, etc., is covered with the mortar or cement in which the fire-proofing is to be set, practically no oxidation takes place, and that such beams, girders and coulmns are in perfect condition after twelve to fifteen years; while beams, girders and columns that are simply protected, without having the mortar in contact with the steel, have been found somewhat seriously oxidized."

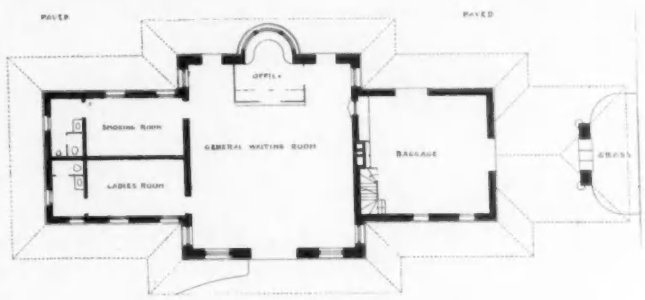
Finally, the detrimental radiation of moisture or the leakage of gases from pipes, vents, etc., can be avoided by placing all piping in separate chases, shut off from the metal columns by means of masonry or terra-cotta coverings. In many early examples of high building work the piping was run up alongside the metal columns, within the same enclosure, and certain column forms have been recommended for use because they allowed space between the flanges for the running of pipes. The writer even knows of instances where the column cap-plates were cut with slotted holes to permit pipes to pass up close to the shaft. This is a most dangerous practice, and owners of buildings where such methods have been followed would do well to make investigations without delay.

The conclusion therefore seems tenable that skeleton construction *can* be made safe and permanent. There are certainly flagrant examples of poor, cheap and even insecure construction, but wide-sweeping condemnations of skeleton methods cannot be drawn from the shortsighted practice of careless or ignorant investors. If the proper materials are used, with adequate care for initial protection and for permanent preservation, we can see no reason to question the ultimate wisdom of present conservative methods.

Selected Miscellany.

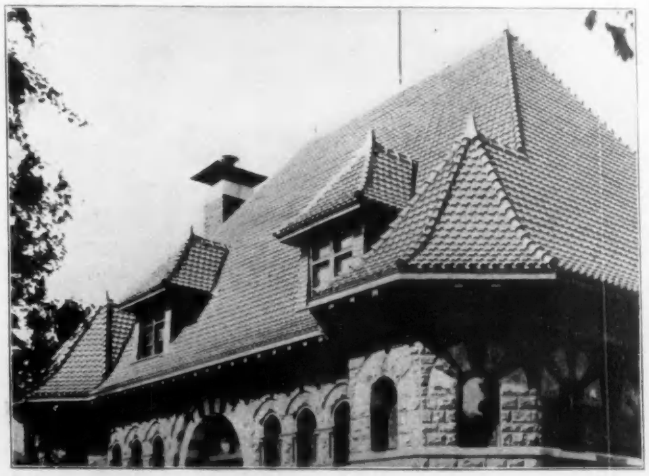
ROTCH TRAVELING SCHOLARSHIP.

The nineteenth Rotch Traveling Scholarship has this year been awarded to Mr. J. F. Clapp, a graduate of the Institute of Technology and a student employed in the office of Shepley, Rutan & Coolidge. Mr. Clapp is thoroughly equipped for the prize which he has won, and will go abroad under the most favorable circumstances. The problem for the competition in design was a city hall such as would be required by a municipality like Boston, Buffalo or Cleveland. The jury consisted of Messrs. E. R. Willson of Providence, A. W. Lord of New York, and W. E. Chamberlin of Cambridge. Mr. Lord was



PLAN.

RAILWAY STATION, MOLINE, ILL.
O. Z. Cervin, Architect.

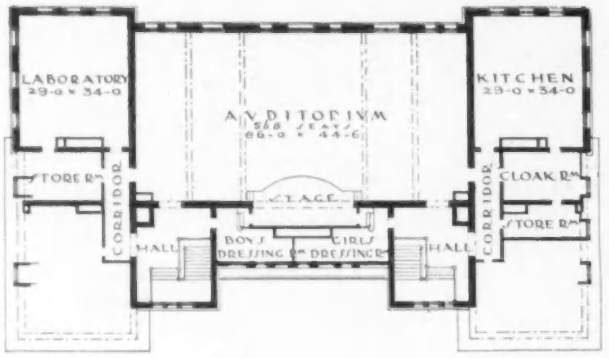


ROOF OF UNITED STATES POST OFFICE, MADISON, IND.
Covered with Ludowici Roofing Tile.

the fifth holder of the Rotch Scholarship. The custom has been started of including in the jury each year one past holder of the scholarship. There were seven competitors for the scholarship this year.

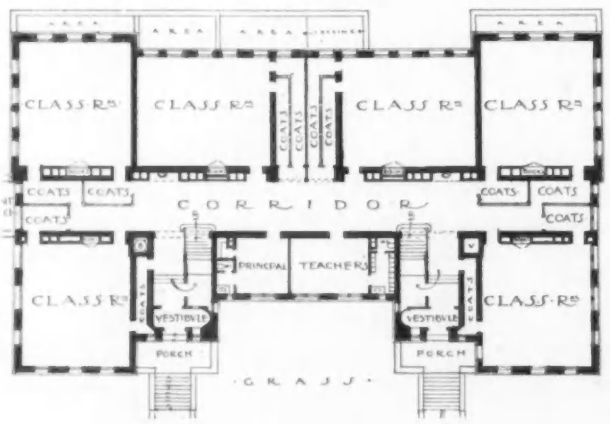
NELSON ROBINSON, JR., HALL AT HARVARD.

The Department of Architecture which Harvard University has established upon so thorough a basis dedicated its new building on May 22. This structure, known as the Nelson Robinson, Jr., Hall, is probably the most thoroughly equipped structure for the purpose in



THIRD FLOOR PLAN.

SECOND STORY IS A DUPLICATE OF THE FIRST EXCEPT IN PLACE OF TEACHERS' ROOMS THERE ARE SEWING ROOMS.



FIRST FLOOR PLAN.

PIERCE GRAMMAR SCHOOL, BROOKLINE, MASS.
J. A. Schweinfurth, Architect.
(SEE ILLUSTRATION IN PLATE FORM.)

the country. It was built entirely with funds given to the university for the purpose, and there has apparently been no limit to the amount available for every reasonable demand. The structure was designed by McKim, Mead & White, and has been illustrated in past numbers of THE BRICKBUILDER. The department, under the fostering care of Prof. H. Langford Warren, has developed in an eminently satisfactory manner and in spite of the limited accommodations with which it has heretofore been provided. Its material surroundings are now so ideal that we may reasonably expect a large access to its growth.

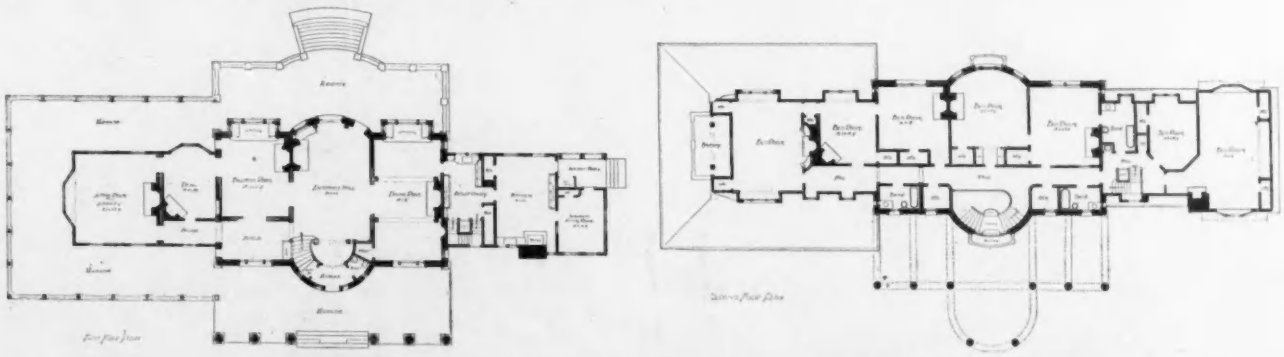
HAMILTON STORAGE WAREHOUSE, NEW YORK CITY.
Built of Brick made by Ohio Mining and Manufacturing Company.

ART NOUVEAU.

PROF. A. D. F. HAMLIN of Columbia University recently delivered before the Boston Society of Architects a very interesting lecture upon the subject of the particular manifestation of design which the French have characterized as L'Art Nouveau. In the course of his lecture he took occasion to call attention to some of the work in this country which in his judgment, if it had been executed abroad, would have attracted much notice and would have been classed within the province of the New Art. The inference which might be drawn from Professor Hamlin's statements is that the New Art

INTERIOR VIEW, PUMPING STATION, PHILADELPHIA, PA.
Lined with Brick made by American Enameled Brick and Tile Company.

HOUSE AT BRYN MAWR, PA. Newman, Woodman & Harris, Architects.



HOUSE AT GLEN COVE, LONG ISLAND. C. P. H. Gilbert, Architect.

(SEE ILLUSTRATION IN PLATE FORM.)

HIGH SCHOOL AT CHILLICOTHE, OHIO. Frank L. Packard, Architect.
Roof covered with 10-inch Conosera Tile, made by Celadon Roofing Tile Company.

was practically a product of this country; that its earliest manifestations would include the work of Mr. Sullivan of Chicago, the Transportation Building, and would even include certain phases of the work of such men as Wilson Eyre and Frank Miles Day. We have been producing a New Art in this country without making any of the fuss or feathers about it which the French seem to find so necessary, and our Art Nouveau, while having much of the element of protest and the direct return to natural forms which has won such favor abroad, has been to a very large extent free from the mere eccentricities of design which have prejudiced the French manifestation.

WE were interested a short time since in an editorial which appeared in the New York *Sun* under the title "Carved New York," which gave the impression that ornamental terra-cotta, the use of which was characterized as the first step in the break from the old-time baldness of design, is rapidly disappearing before the demand for the more expensive and more substantial forms of adornment. As the yellow journals say, this is important if true. But if the *Sun* writer could have used his eyes a little more intelligently he would have appreciated that much in recent building work which he took to be elaborately carved stone was in reality terra-cotta. We cannot altogether blame our designers if so

SCHOOLHOUSE, HYDE PARK, OHIO.
Dornette & Sheppard, Architects. Roofed with American S Tile.

BUILDING FOR ASTOR ESTATE, BROADWAY, NEW YORK.
Clinton & Russell, Architects.
Built with Red Stretcher and Black Header Brick, made by Sayre & Fisher Company.

RESIDENCE AT WASHINGTON, D. C.
James G. Hill, Architect.
Built of Columbus Face Brick (Ironclay).

much of the terra-cotta passes under casual observation as stone, for to the average observer everything which is not red is of stone or iron, and nothing but the old, time-honored Peerless brick color passes for terra-cotta. The differences would be at once perceptible to the trained architectural mind. The editorial in question was admirable. Its only slip was in assuming that all the good architecture was necessarily of stone, which is not the case. Actual count shows that an increasing proportion of the modern buildings are yearly being adorned with terra-cotta. We quote: "Gradually the feeling of respect and appreciation for professional skill and expert advice in matters pertaining to the parks and other public properties is spreading among the people, in spite of occasional outbreaks of well-meant but destructive ignorance. The day of haphazard blundering has gone by. The public eye has been educated to a standard demanding something better than architectural misfits or statues made by stone masons." What is true of New York is equally true of all our large cities. Terra-cotta has not only come to stay but it has ceased to be in any sense a sketch material. It is a finished product.

DETAIL BY SASS & SMALLHEISER, ARCHITECTS.
New Jersey Terra-Cotta Company, Makers.

IN GENERAL.

Heins & La Farge, architects, New York City, have removed their offices to 30 East Twenty-first Street.

J. M. McCollum and Press C. Dowler have formed a copartnership for the practice of architecture: offices, Bank for Savings Building, Pittsburgh, Pa.

Joseph L. Neal and George M. Rowland announce the formation of a copartnership for the practice of architecture under the firm name of Neal & Rowland: offices, 215 Fourth Avenue, Pittsburgh, Pa.

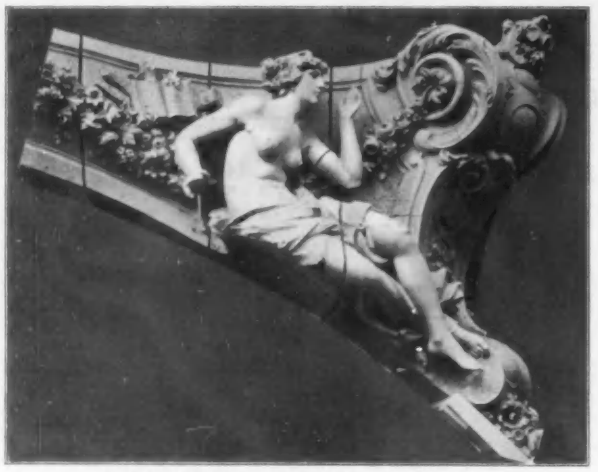
DETAIL BY DONALDSON & MEIER, ARCHITECTS.
Atlantic Terra-Cotta Company, Makers.

J. A. F. Cardiff, architect, Jersey City, N. J., has removed his office to 288 Monmouth Street. Manufacturers' catalogues desired.

At the annual meeting of the Detroit Architectural Club, held April 14, the following named were elected as officers for the ensuing year: president, Cheri Mandelbaum; vice-president, G. H. Ropes; secretary, Edward N. Schilling; treasurer, John J. Frauenfelder; directors, John G. Gillard and Adolph Eisen.

The New York office of the National Fire-proofing Company has been moved from 874 Broadway to 170 Broadway, corner of Maiden Lane.

Frank C. Manson has been appointed manager of the newly opened office of the Ludowici Roofing Tile Company, Townsend Building, Twenty-fifth Street and Broadway, New York City.



DETAIL BY BRUCE PRICE, ARCHITECT.
Conkling-Armstrong Terra-Cotta Company, Makers.

The National Fire-proofing Company have secured the contract for fire-proofing the Farmers' Deposit National Bank Building, to be erected at corner of Fifth Avenue and Wood Street, Pittsburgh, Pa. The building is to be twenty-four stories high. Alden & Harlow, architects; George A. Fuller Company, general contractors.

What is to be one of the finest buildings in Canada is now under construction at Quebec for the Metropolitan Life Insurance Company of New York, from plans of Messrs. N. Le Brun & Sons. It is to be faced with rough-textured, red-face brick, furnished by Messrs. Fiske &

DETAIL BY MARCUS T. REYNOLDS, ARCHITECT.
Excelsior Terra-Cotta Company, Makers.

Co., Boston, Mass. The effective qualities of this brick are attested by the ever-increasing demand for it, it being shipped to all sections of the country.

To meet the demands of a rapidly increasing business the Atlantic Terra-Cotta Company has been obliged to make extensive additions to its plant. Two seventy-ton kilns and necessary shop rooms are now being erected. The plant when completed will be one of the very largest in the country. As is well known, the company is supplying a very superior grade of terra-cotta to the market. Among the most recent buildings on which they are supplying terra-cotta are the following: Studebaker Building, New York City, James Brown Lord, architect; Marie Antoinette Hotel, New York City, C. P. H. Gilbert, architect; Berkshire apartment house, New York City, H. Fairchild Steven, architect; Asbury Hospital, Minneapolis, Minn., E. P. Overmire, architect; Pennsyl-

DETAIL EXECUTED BY THE NEW YORK ARCHITECTURAL TERRA-COTTA COMPANY.

vania Building, Philadelphia, Pa., H. L. A. Jekel, architect; Belvidere Hotel, Baltimore, Md., Parker & Thomas, architects. The company is making a specialty of semi-glazes and dull enamel. The terra-cotta which they are furnishing for the Flatiron Building, Twenty-Third Street and Fifth Avenue, New York City, is an example of the dull enamel terra-cotta manufactured by them.

WANTED—Thoroughly experienced architectural draughtsman for general office work. Apply, stating qualifications and salary desired, to Albert Kahn, 1117 Union Trust Building, Detroit, Mich.

DETAIL BY REED & STERN, ARCHITECTS.
Northwestern Terra-Cotta Company, Makers.

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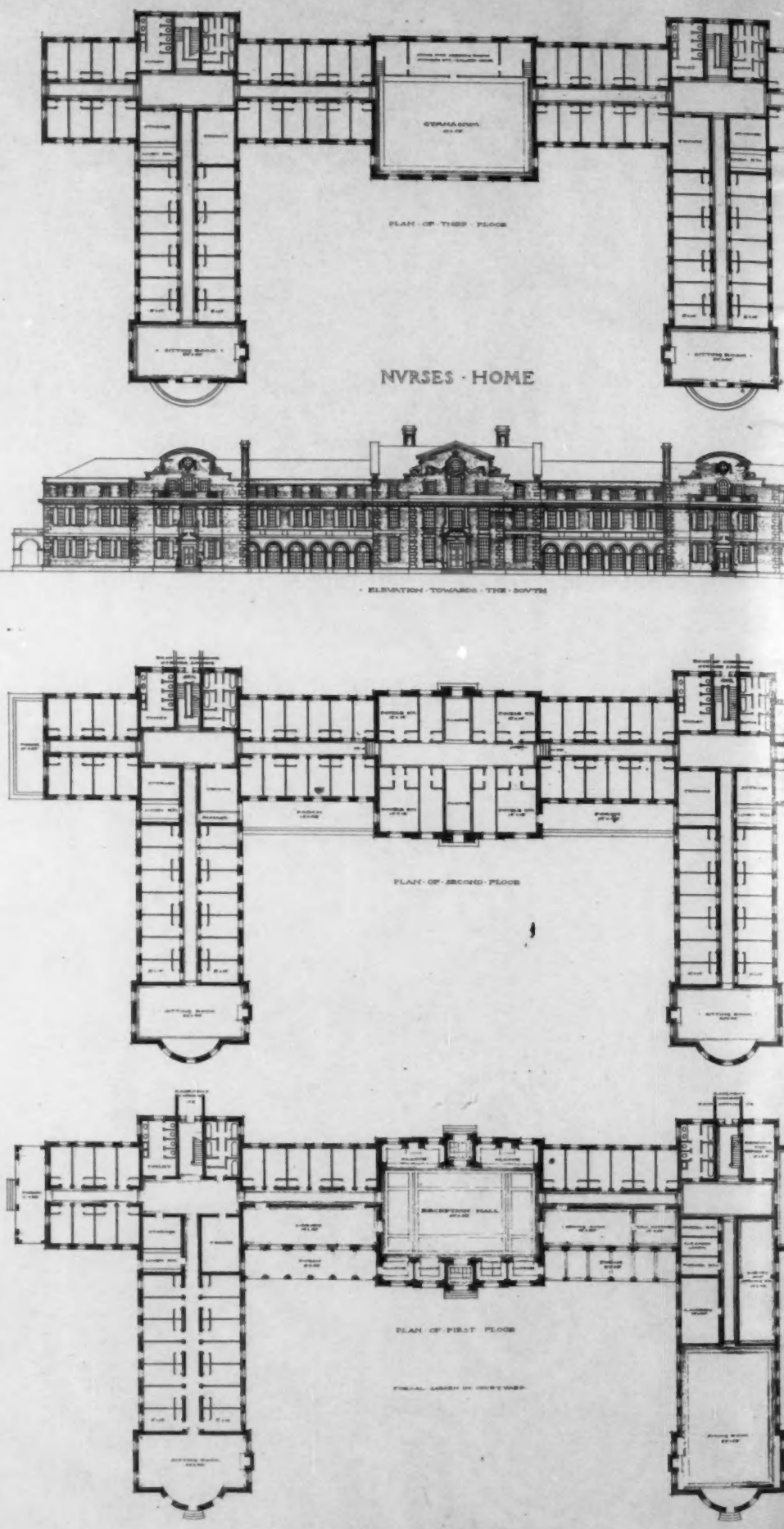
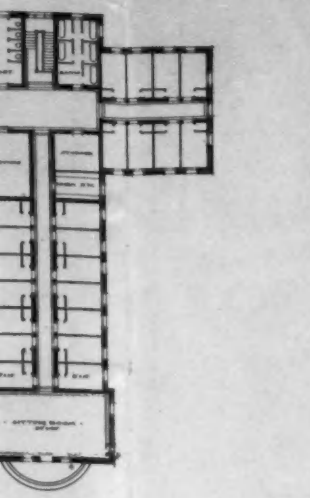
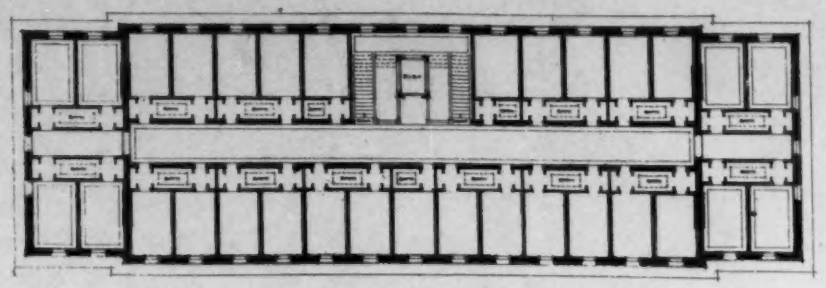


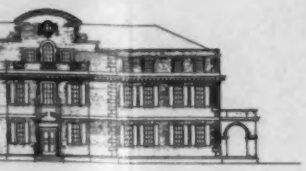
ACCEPTED DESIGN FOR MUNICIPAL HOSPITAL FO
FRANK MILES DAY &

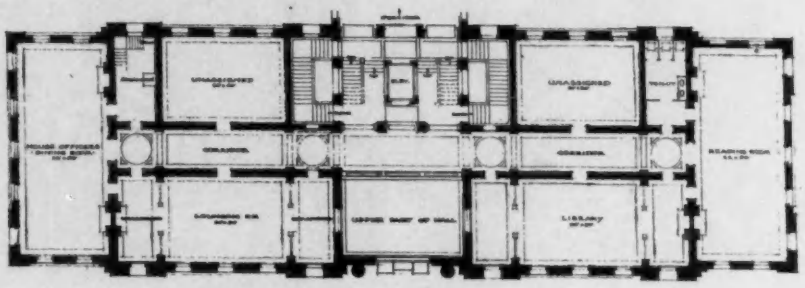
PLATES 33 and 40.



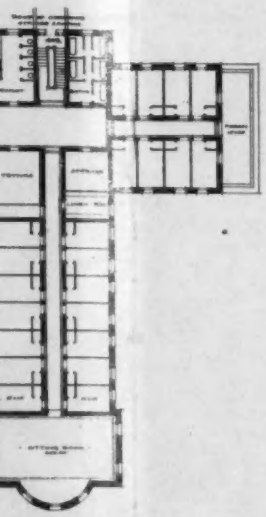


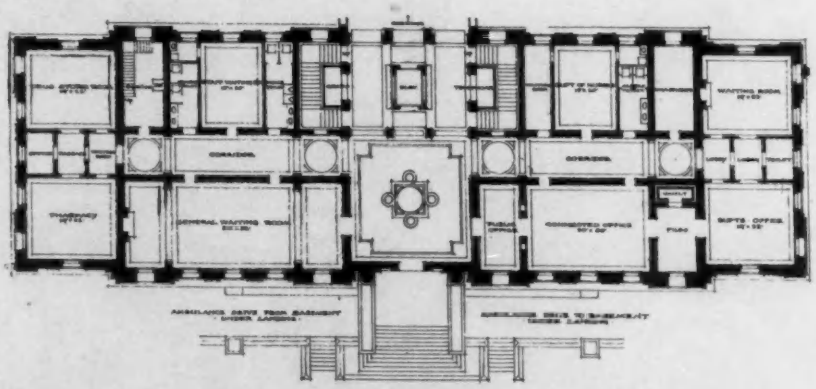
PLAN · OF · THIRD · FLOOR ·
(HOUSE OFFICERS AND WARDS.)



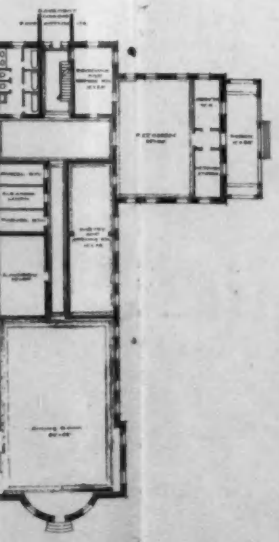


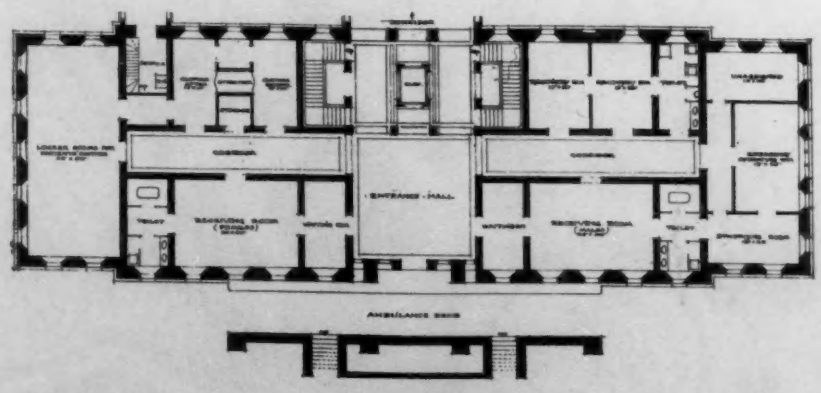
· PLAN · OF · SECOND · FLOOR ·





· PLAN · OF · FIRST · FLOOR ·

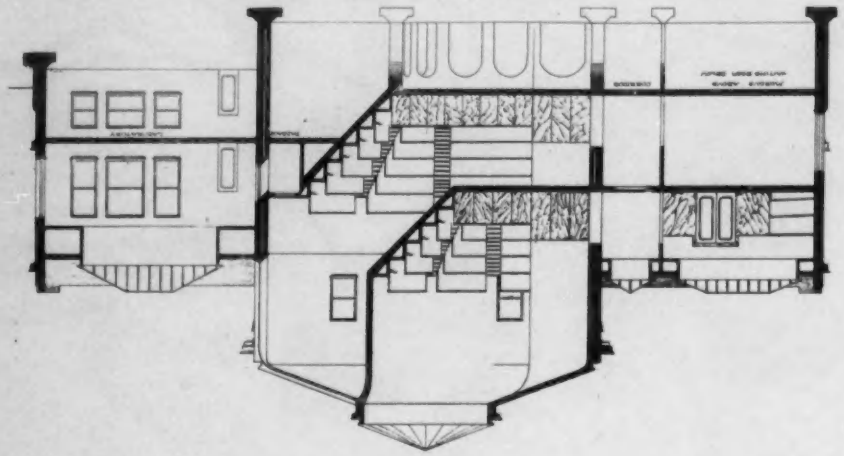


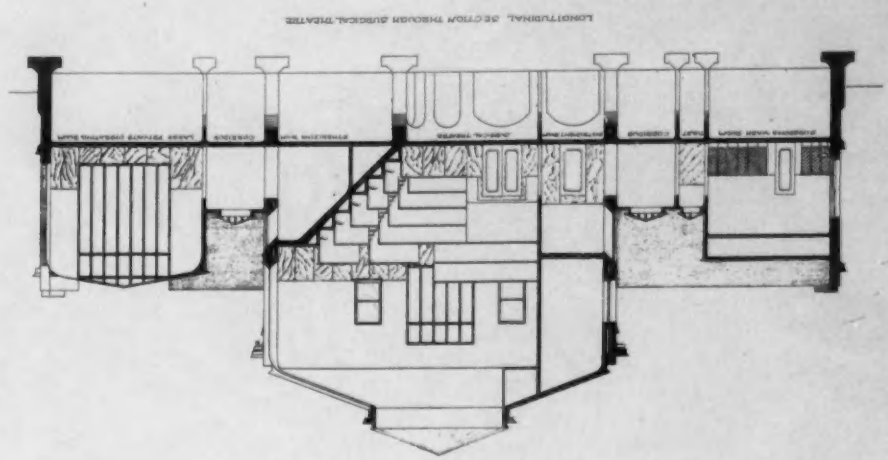


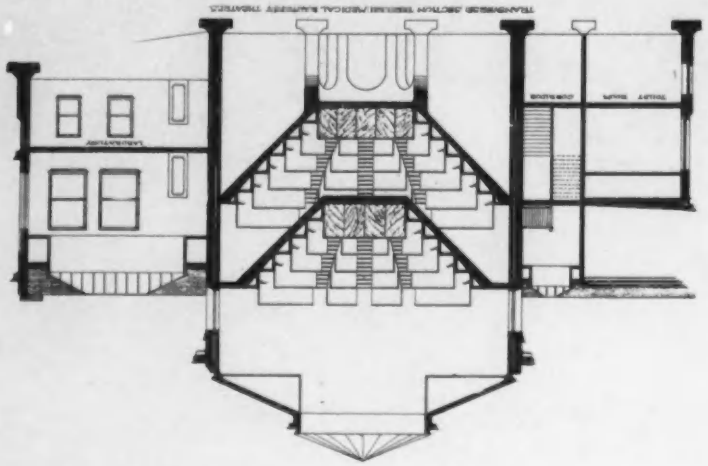
· PLAN · OF · BASEMENT ·

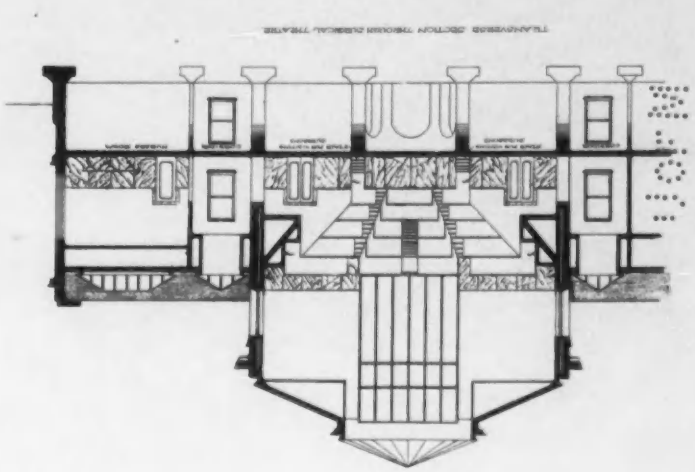
OSPITAL FOR THE DISTRICT OF COLUMBIA AT WASHINGTON.

HR. MILES DAY & BROTHER, ARCHITECTS.

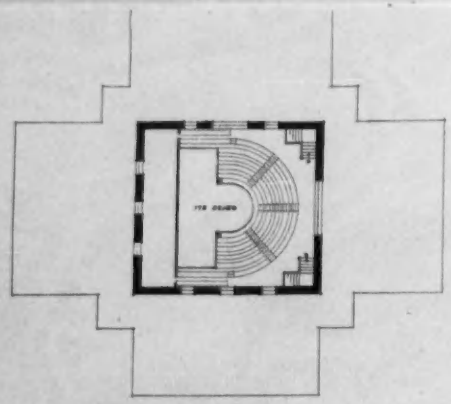




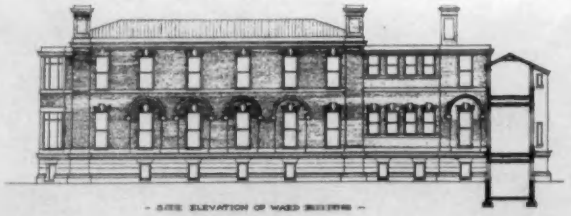




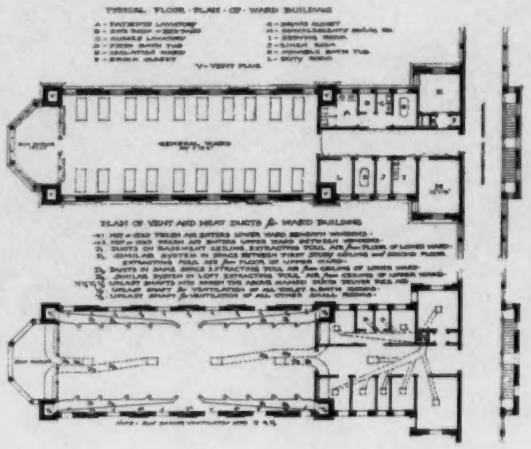
LONGITUDINAL SECTION THROUGH MEDICAL & AUTOPSY THEATRES.



SURGICAL THEATRE

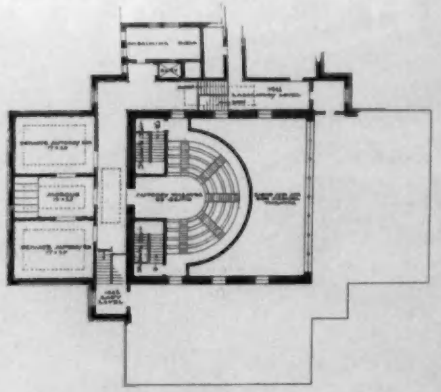


- SIDE ELEVATION OF WARD BUILDING -

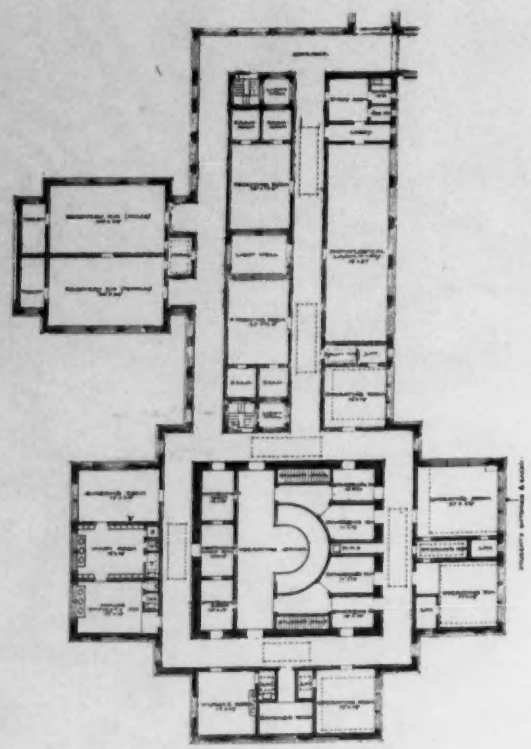


TYPICAL FLOOR PLAN OF WARD BUILDING

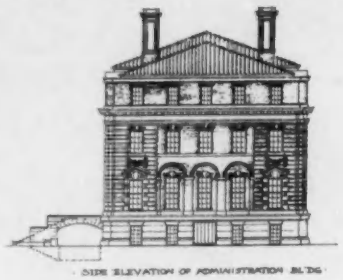
PLAN OF VENT AND HEAT DUCTS IN WARD BUILDING



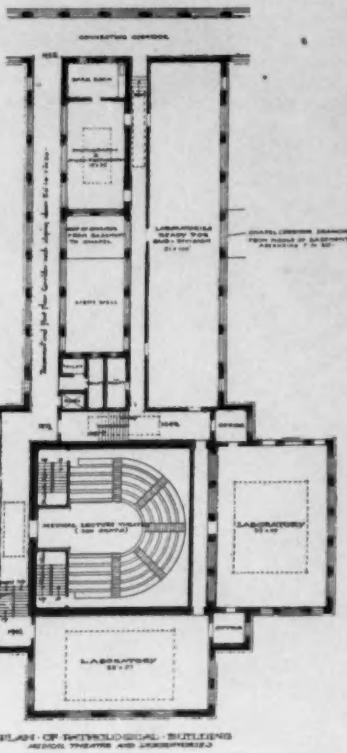
PLAN OF PATHOLOGICAL BUILDING
AUTOPSY FLOOR



PLAN OF SURGICAL BUILDING



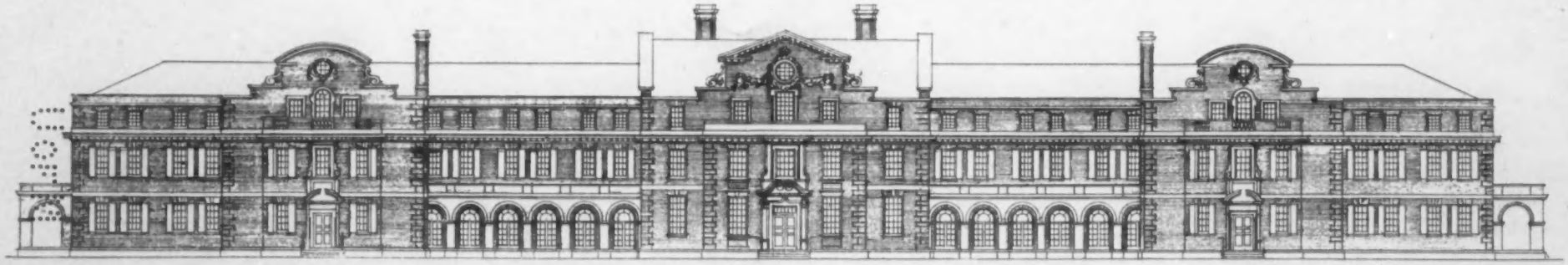
SIDE ELEVATION OF ADMINISTRATION BLDG.



PLAN OF PATHOLOGICAL BUILDING
MEDICAL THEATRE AND LABORATORIES

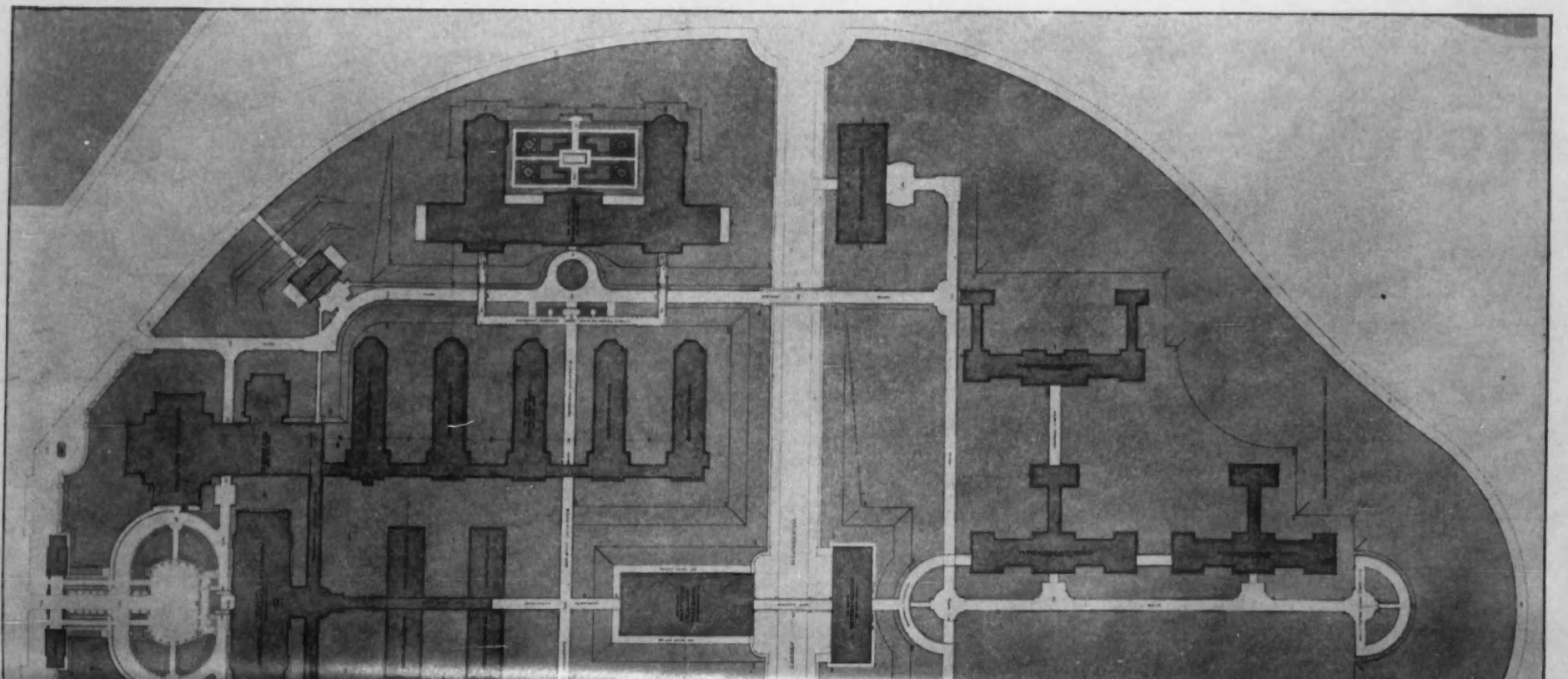
ACCEPTED DESIGN FOR MUNICIPAL HOSPITAL FOR THE DISTRICT OF COLUMBIA AT WASHINGTON.

FRANK MILES DAY & BROTHER, ARCHITECTS.



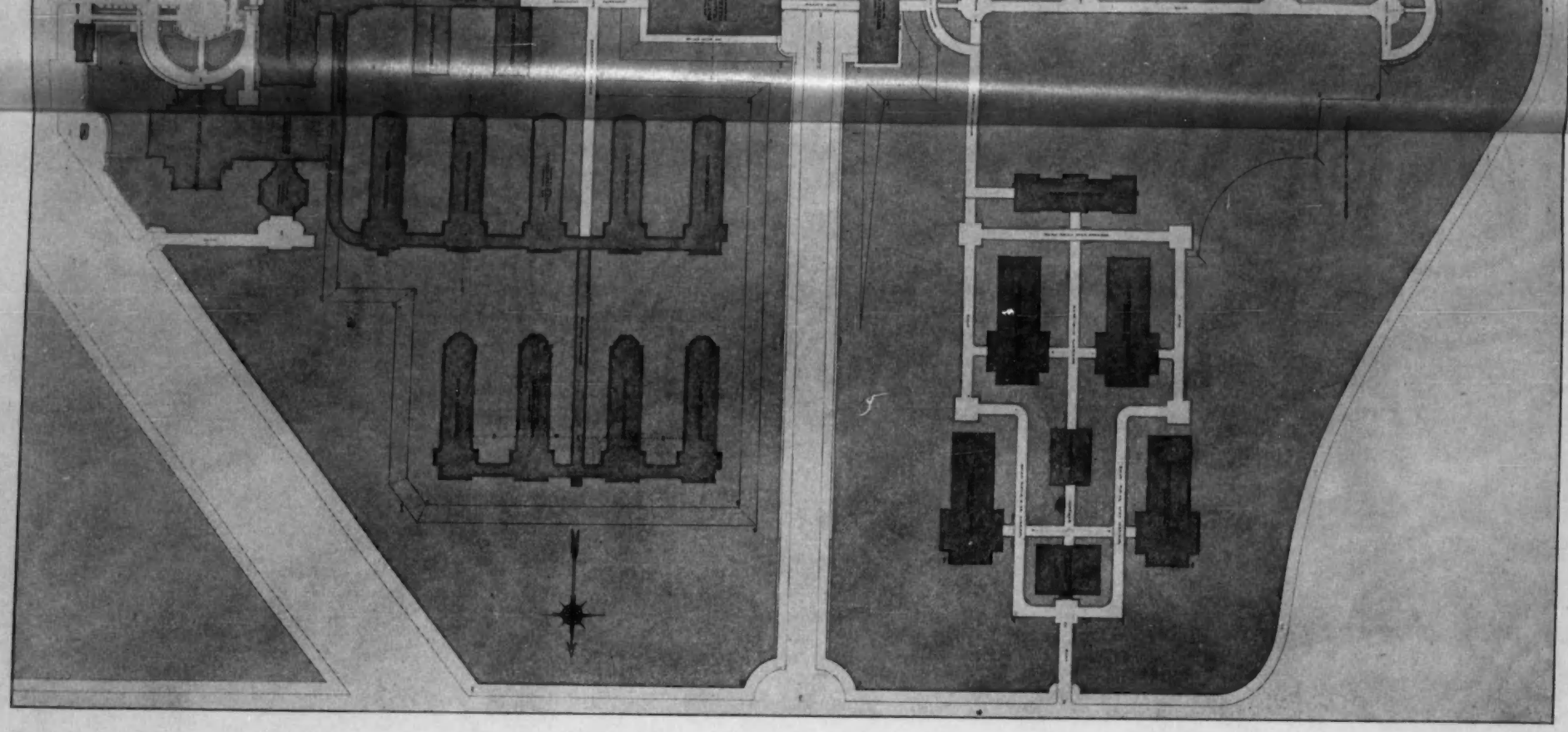
ELEVATION TOWARDS THE SOUTH

NURSES' HOME.

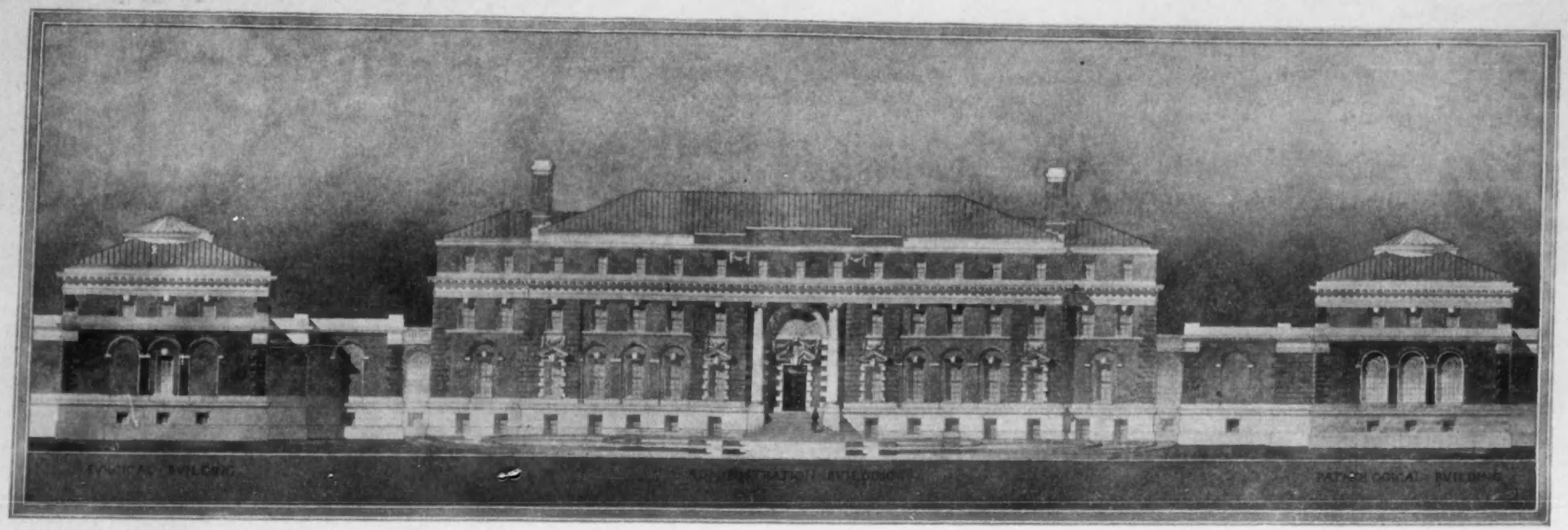


THE BRI

VOL. 11. NO. 5.



GROUND PLAN.



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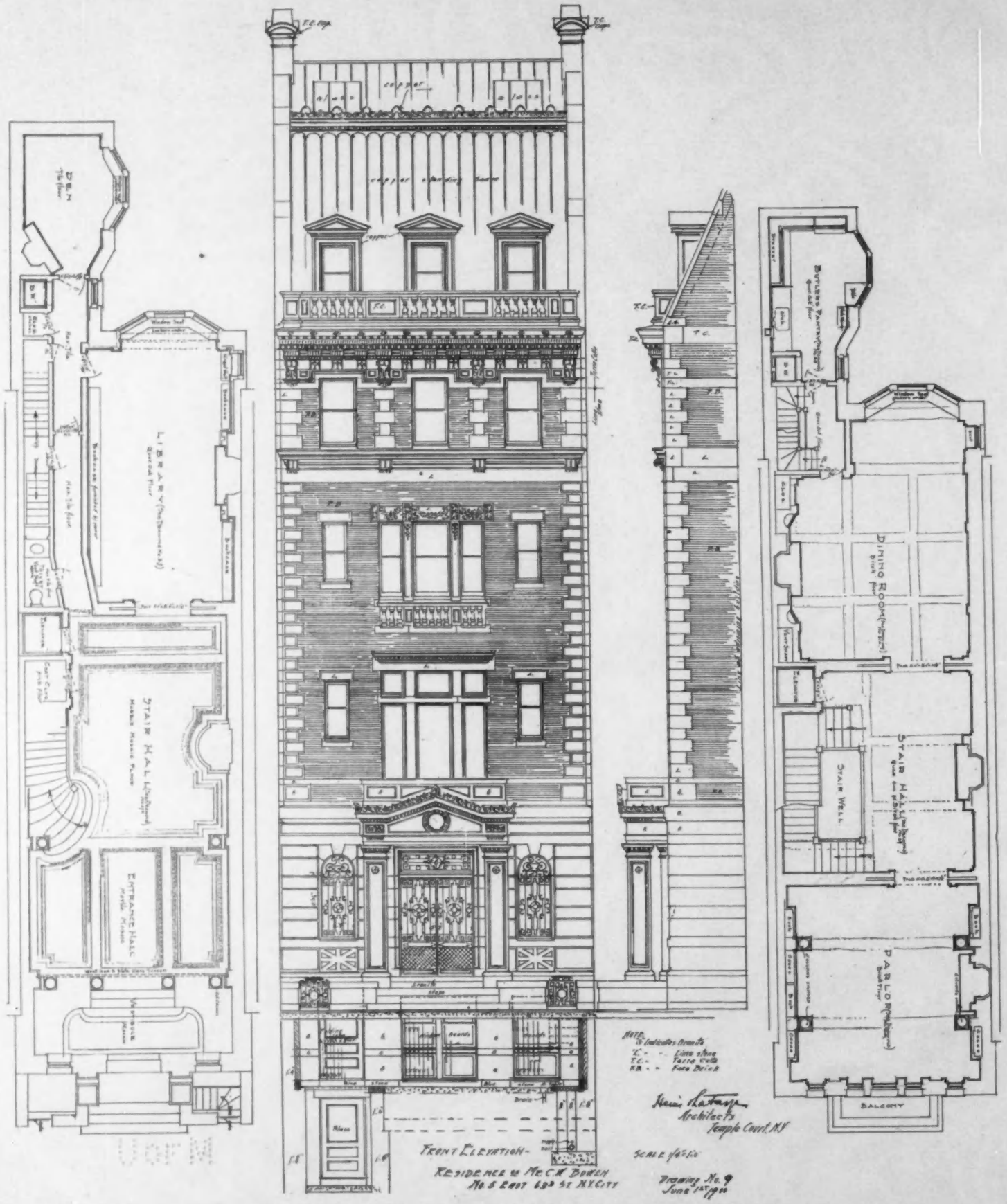
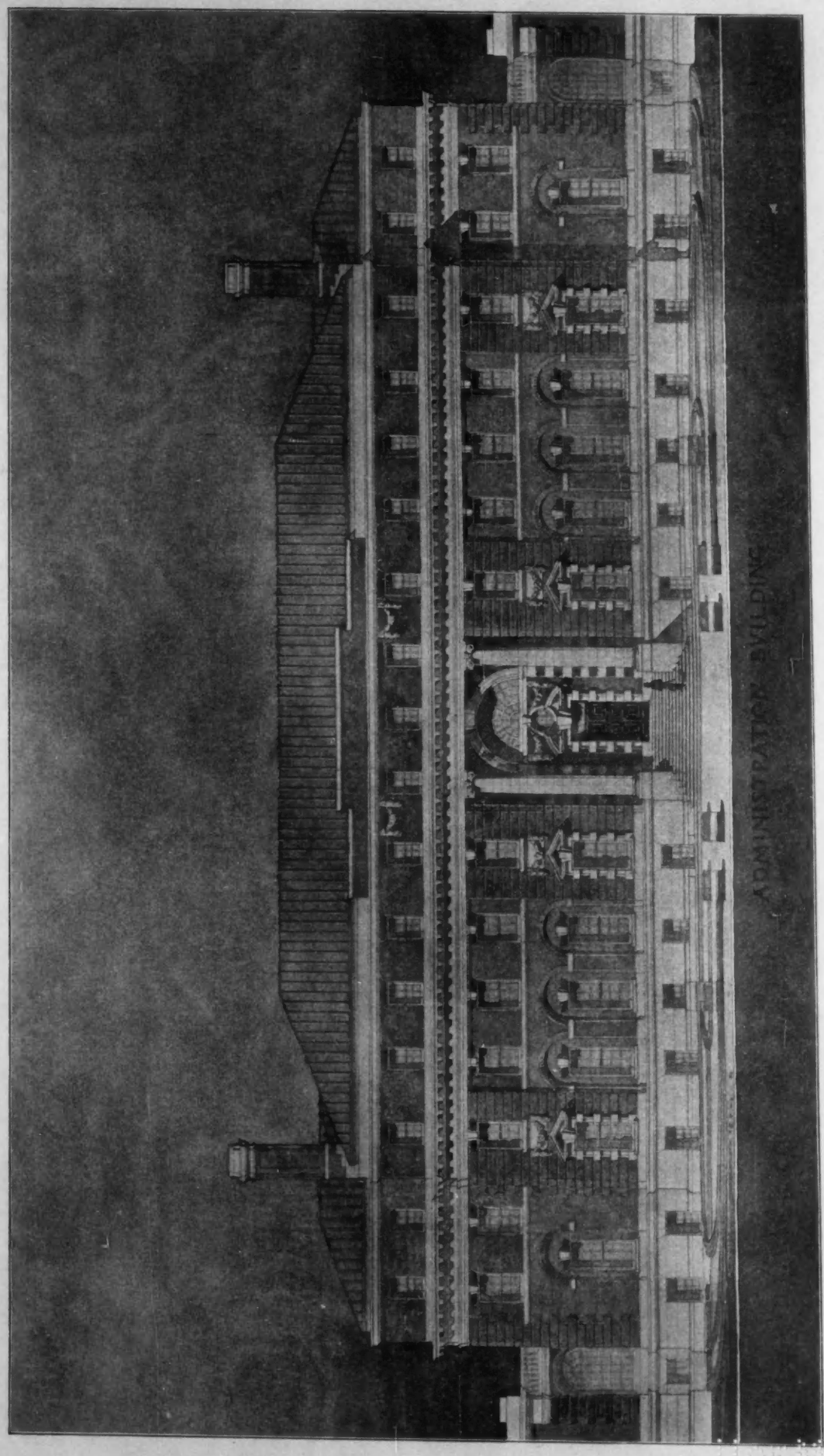


HOUSE, NO. 5 EAST SIXTY-THIRD STREET, NEW YORK CITY.

HEINS & LA FARGE, ARCHITECTS.



ACCEPTED DESIGN FOR MUNICIPAL HOSPITAL FOR THE DISTRICT OF COLUMBIA AT WASHINGTON.

FRANK MILES DAY & BROTHER ARCHITECTS.

HOUSE AT POUGHKEEPSIE, N. Y.

HORACE TRUMBAUER, ARCHITECT.